Exam results

Exam completed, results below.

Your total score is 19/90
Results and explanations below

Question 1

C

Incorrect

A 66-year-old woman who had been undergoing regular haemodialysis for 2 years experienced repeated episodes of hypotension during dialysis. She usually arrived for dialysis approximately 1.5 kg over her dry weight and, during the second hour of each dialysis, her BP fell to <80 mmHg systolic. She was otherwise well and was not taking any antihypertensive drugs.

On examination, there was no oedema.

Investigations (performed before a mid-week dialysis session):

serum sodium	134 mmol/L (137–144)
serum potassium	4.3 mmol/L (3.5–4.9)
serum adjusted calcium	2.50 mmol/L (2.20–2.60)
serum phosphate	1.40 mmol/L (0.80–1.45)
serum albumin	31 g/L (37–49)

What intervention is most likely to be helpful?

Answers

A: intradialytic parenteral nutrition
B: low-calcium dialysate
C: perform dialysis but not ultrafiltration at start of dialysis sessions
D: reduce sodium concentration in dialysate at start of dialysis sessions
E: reduce temperature of dialysate

Correct answer: E

Explanation

Reduced dialysate temperature has been shown to reduce the incidence of intradialytic hypotension. Intradialytic parenteral nutrition (answer option A) has not been shown to be beneficial, while perform dialysis but not ultrafiltration at start of dialysis sessions (answer option C) is unlikely to help with the low-volume ultrafiltration needed in this case. Low-calcium dialysate (answer option B) and reduce sodium concentration in dialysate at start of dialysis sessions (answer option D) may worsen the problem.

Question 2

E

Incorrect

A 56-year-old man complained of bruising over his arms. He had presented with AKI resulting from interstitial nephritis 2 weeks previously, and had initially been treated with continuous haemofiltration in the intensive care unit for 10 days before being switched to haemodialysis three times per week. He was taking prednisolone 40 mg daily and omeprazole 20 mg daily.

Investigations:

haemoglobin	91 g/L (130–180)
white cell count	7.2×10^9/L (4.0–11.0)
platelet count	12×10^9/L (150–400)

serum sodium	134 mmol/L (137–144)
serum potassium	4.3 mmol/L (3.5–4.9)
serum creatinine	513 µmol/L (60–110)

A diagnosis of heparin-induced thrombocytopenia was made.

What is the most appropriate anticoagulation to use for his dialysis?

Answers

A: argatroban
B: aspirin
C: enoxaparin
D: intravenous citrate
E: minimal heparin with only a heparin flush of the dialysis circuit

Correct answer: A

Explanation

This is severe heparin-induced thrombocytopenia (HIT) and heparin in any form should be avoided, so enoxaparin (answer option C) and minimal heparin with only a heparin flush of the dialysis circuit (answer option E) are incorrect. Aspirin (answer option B) is not effective. Regional, but not intravenous citrate (answer option D), might be used. Argatroban (answer option A) is a short-acting, non-heparin anticoagulant, which can be used in patients with HIT. Anticoagulant-free haemodialysis might be tried but is not given as an option.

Question 3

C

Incorrect

A 22-year-old man presented with a 2-week history of bilateral ankle swelling and mild ankle pain. He had no relevant past medical history and was not taking any medication. He worked as a shop assistant, and neither smoked nor used recreational drugs.

On examination, his BP was 110/55 mmHg, and he had pitting oedema to his mid-calf. His chest and abdomen were normal. He had small lymph nodes palpable in his groin. Urinalysis showed blood 2+, protein 4+.

Investigations:

serum sodium	141 mmol/L (137–144)
serum potassium	4.1 mmol/L (3.5–4.9)
serum creatinine	101 µmol/L (60–110)
serum albumin	14 g/L (37–49)
urine protein:creatinine ratio	762 mg/mmol (<30)

What investigation is most likely to lead to the diagnosis?

Answers

A: ANCA
B: antinuclear antibodies
C: Epstein–Barr virus serology
D: serum cryoglobulin
E: serum protein electrophoresis

Correct answer: B

Explanation

This patient has nephrotic syndrome. Given the ankle pain and lymphadenopathy, it would be reasonable to screen for systemic lupus erythematosus. ANCA (answer option A), Epstein–Barr virus serology (answer option C), serum cryoglobulin (answer option D) and serum protein electrophoresis (answer option E) are very unlikely to be helpful.

Question 4

B

Incorrect

A 63-year-old woman presented with a 3-day history of haemoptysis. She also had a 4-month history of lethargy and weight loss of 3 kg.

On examination, she appeared pale and had red eyes bilaterally. There were no other abnormalities. Urinalysis showed blood 3+, protein 2+.

Investigations:

haemoglobin	89 g/L (115–165)
white cell count	13.6 × 10^9/L (4.0–11.0)
eosinophil count	0.80 × 10^9/L (0.04–0.40)
platelet count	389 × 10^9/L (150–400)
serum creatinine	389 µmol/L (60–110)
serum CRP	293 mg/L (<10)

chest X-ray	bilateral patchy shadowing in lower zones

What is the most likely diagnosis?

Answers

A: anti-glomerular basement membrane antibody disease
B: eosinophilic granulomatosis with polyangiitis
C: granulomatosis with polyangiitis
D: systemic lupus erythematosus
E: tubulointerstitial nephritis with uveitis

Correct answer: C

Explanation

This presentation is consistent with a pulmonary renal syndrome due to granulomatosis with polyangiitis (answer option C). Eye abnormalities, particularly conjunctivitis, and a mild eosinophilia are common in granulomatosis with polyangiitis. The extra-renal features make anti-glomerular basement membrane antibody disease (answer option A) less likely. The clinical features are not consistent with tubulointerstitial nephritis with uveitis (answer option E), eosinophilic granulomatosis with polyangiitis (answer option B) or systemic lupus erythematosus (answer option D).

Question 5

A

Correct

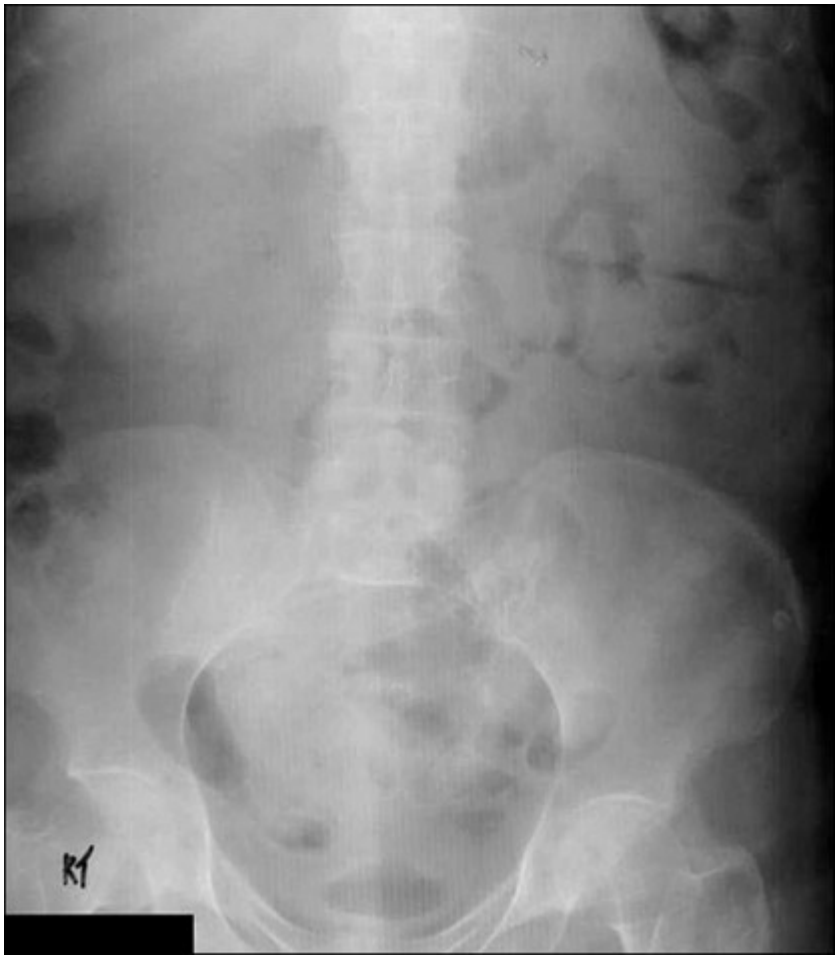
A 53-year-old woman was brought by her family to the emergency department in an obtunded state. She had become increasingly unwell over the previous 2–3 days, with intermittent pyrexia and confusion. Her history included a 5-year history of type 2 diabetes mellitus, managed with oral hypoglycaemic drugs.

On examination, her temperature was 37.6°C, her pulse was 110 beats/min and her BP was 124/82 mmHg. She had left-sided abdominal tenderness and was unresponsive.

Investigations:

haemoglobin	126 g/L (115–165)
white cell count	12.4 × 10^9/L (4.0–11.0)
platelet count	396 × 10^9/L (150–400)

serum urea	26.2 mmol/L (2.5–7.0)
serum creatinine	338 µmol/L (60–110)
serum adjusted calcium	2.58 mmol/L (2.20–2.60)
fasting plasma glucose	22.4 mmol/L (3.0–6.0)
plain X-ray of abdomen	see image



What is the most likely diagnosis?

Answers

A: emphysematous pyelonephritis
B: leaking aortic aneurysm
C: multiple myeloma
D: perforated abdominal viscus
E: renal stone disease

Correct answer: A

Explanation

The image shows gas in the collecting system of the left kidney, which is seen in emphysematous pyelonephritis (answer option A). This is a very severe infection that is more common in patients with diabetes melitus, although it is still rare. Patients are often very unwell and need nephrectomy. None of the other diagnoses would present in this manner.

Question 6

E

Correct

A 62-year-old man was found to have proteinuria on routine testing. He had a 3-year history of exertional angina but his symptoms had been well controlled since he had been taking atenolol 50 mg daily and amlodipine 10 mg daily.

On examination, his BP was 129/76 mmHg and his JVP was not raised. He had mild ankle oedema, but his chest was clear. Urinalysis showed blood 1+, protein 4+.

Investigations:

serum creatinine	92 µmol/L (60–110)
serum albumin	37 g/L (37–49)
urine protein:creatinine ratio	390 mg/mmol (<30)
renal biopsy histology	membranous nephropathy

What is the most appropriate treatment?

Answers

A: ciclosporin
B: cyclophosphamide and high-dose corticosteroids in alternate months for 6 months
C: furosemide
D: high-dose oral prednisolone
E: ramipril

Correct answer: E

Explanation

Although he has idiopathic membranous nephropathy (IMN) with heavy proteinuria, he does not have nephrotic syndrome and, in the UK, it would be usual practice to treat 'conservatively' with a regimen including an ACE inhibitor for at least 6 months before considering specific therapy (answer option E). The mild ankle oedema has probably been caused by amlodipine and does not require treatment with furosemide (answer option C). Prednisolone (answer option D) alone is not an effective treatment for IMN.

Question 7

E

Incorrect

A 56-year-old woman presented with swollen ankles. She had a 3-year history of back, knee and ankle pains for which she was taking ibuprofen 400 mg three times daily. There was no other significant past medical history and she was not taking any other regular medication.

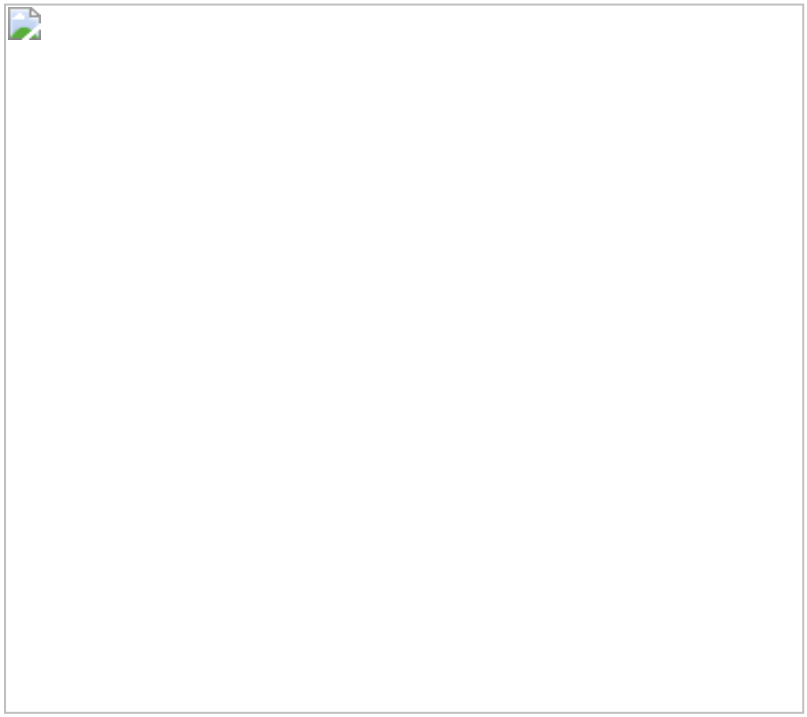
On examination, she was obese. Her BP was 164/84 mmHg. There was bilateral pitting oedema of the ankles, but no other abnormalities. Urinalysis showed protein 4+.

Investigations:

serum creatinine	130 µmol/L (60–110)

serum albumin	26 g/L (37–49)
urine albumin:creatinine ratio	496.0 mg/mmol (<3.5)
ultrasound scan of kidneys	normal

A renal biopsy was performed with difficulty because of her build. Renal tissue was present only in the sample sent for immunofluorescence (IF). The result of IF for IgG is shown (see image). IF for complement C3 yielded a similar result. IF for other immunoglobulins and complement components was negative.



What is the most likely diagnosis?

Answers

A: focal segmental glomerulosclerosis
B: idiopathic membranous nephropathy
C: immune complex membranoproliferative glomerulonephritis
D: interstitial nephritis
E: systemic lupus erythematosus

Correct answer: B

Explanation

The image shows the typical granular pattern of deposition of IgG (and complement C3) of membranous nephropathy (answer option B). A similar pattern for complement C3, but not usually for IgG, can occur in immune complex membranoproliferative glomerulonephritis (answer option C) but the clinical features make this much less likely. In membranous lupus nephritis, immunofluorescence for other immunoglobulins and complement components is positive and, in the other two options, immunofluorescence is usually negative or non-specific.

Question 8

A

Correct

A 53-year-old man presented to his general practitioner with a right inguinal hernia. He had a 6-year history of hypertension that had been initially treated with atenolol but he had neither visited a doctor nor taken any medication for 3 years. There was no other significant medical history. He smoked 30 cigarettes per day.

On examination, his BP was 176/96 mmHg. His heart sounds were normal and his chest was clear. Abdominal examination was normal. Fundoscopy showed bilateral dot haemorrhages, microaneurysms and hard exudates. Urinalysis showed blood 1+, protein 4+.

Investigations:

serum creatinine	176 µmol/L (60–110)
fasting plasma glucose	16.7 mmol/L (3.0–6.0)
urine albumin:creatinine ratio	287.0 mg/mmol (<2.5)
ultrasound scan of kidneys	normal appearances, left kidney 10.4 cm, right kidney 11.2 cm

What is the most likely diagnosis?

Answers

A: diabetic nephropathy
B: focal segmental glomerulosclerosis
C: hypertensive nephropathy
D: idiopathic membranous nephropathy
E: ischaemic nephropathy

Correct answer: A

Explanation

This man has type 2 diabetes mellitus that is newly diagnosed but has clearly been present for some time as he has diabetic retinopathy on fundoscopy. He has heavy proteinuria, which points to diabetic nephropathy as the most likely renal diagnosis (answer option A). In type 2 diabetes mellitus, unlike in type 1, diabetic nephropathy may be present when the diagnosis of diabetes is first made.

Question 9

A

Correct

A 21-year-old man presented with progressive deafness and was found to have bilateral high-tone hearing loss. Further investigations showed CKD stage 5. No family history was available as he had been adopted as a baby.

What eye abnormality is most likely to be present?

Answers

A: anterior lenticonus
B: corneal deposits
C: lens dislocation
D: optic atrophy
E: retinitis pigmentosa

Correct answer: A

Explanation

This man has Alport syndrome. Of the options given, anterior lenticonus (answer option A) is the most common eye abnormality, occurring in about 25% of adult males with Alport syndrome. A retinopathy is present in over 80% of affected adult males but this is not listed as an option.

Question 10

E

Correct

A 26-year-old woman with spina bifida had become increasingly confused over the preceding 12 hours. Her past medical history included recurrent urinary tract infections and anaphylaxis secondary to penicillin. MRSA had been cultured from her urine during her previous two admissions.

On examination, her temperature was 38.9°C, her pulse was 112 beats/min and her BP was 90/56 mmHg. Her Glasgow coma score was 10. Urinalysis showed leukocytes and erythrocytes.

Investigations:

haemoglobin	136 g/L (115–165)
white cell count	23.6 × 10^9/L (4.0–11.0)
neutrophil count	18.4 × 10^9/L (1.5–7.0)

serum sodium	132 mmol/L (137–144)
serum potassium	4.9 mmol/L (3.5–4.9)
serum urea	14.7 mmol/L (2.5–7.0)
serum creatinine	212 µmol/L (60–110)

What is the most appropriate antibiotic to include in her regimen?

Answers

A: cefuroxime
B: ciprofloxacin
C: piperacillin with tazobactam
D: rifampicin
E: vancomycin

Correct answer: E

Explanation

This patient may have septicaemia as a result of the MRSA urinary tract infection, so a glycopeptide antibiotic (in this case, vancomycin, answer option E) should be included in her regimen.

Question 11

D

Incorrect

A 74-year-old man presented with AKI. He also had hypertension, ischaemic heart disease and type 2 diabetes mellitus. He had recently been found to be in atrial fibrillation and anticoagulation with warfarin was started. Shortly before presentation, he had developed lower abdominal pain, associated with watery diarrhoea that had become bloodstained. He smoked 25 cigarettes per day.

On examination, he was afebrile. His pulse was 104 beats/min and irregularly irregular, his BP was 176/94 mmHg, and he was euvolaemic. He had abdominal tenderness below the umbilicus without guarding or rebound. No abdominal masses were palpable. A purpuric rash was noted on his feet, legs and buttocks. His peripheral pulses were absent below the knees bilaterally. Urinalysis showed blood 2+, protein 2+.

Investigations:

haemoglobin	106 g/L (130–180)
white cell count	22 × 10^9/L (4.0–11.0)
neutrophil count	18.0 × 10^9/L (1.5–7.0)
lymphocyte count	3.1 × 10^9/L (1.5–4.0)
eosinophil count	0.9 × 10^9/L (0.04–0.40)
platelet count	164 × 10^9/L (150–400)
serum creatinine	305 µmol/L (60–110)
serum CRP	86 mg/L (<10)
serum complement C3	55 mg/dL (65–190)
serum complement C4	12 mg/dL (15–50)

What is the most likely cause of his AKI?

Answers

A: acute interstitial nephritis
B: aortic dissection
C: cholesterol embolisation syndrome
D: cryoglobulinaemia
E: IgA vasculitis

Correct answer: C

Explanation

This patient with vascular disease is likely to have developed cholesterol embolisation syndrome (answer option C) related to starting warfarin. The combination of eosinophilia and hypocomplementaemia makes acute interstitial nephritis (option A), aortic dissection (answer option B) and IgA vasculitis (answer option E) unlikely. Cryoglobulinaemia (answer option D) is very uncommon in this context.

Question 12

C

Correct

A 50-year-old woman was referred with a 6-month history of myalgia and arthralgia. She had a history of recurrent renal stones and was undergoing intermittent lithotripsy. Her grandmother and father had experienced renal problems.

On examination, she had generalised muscle weakness, but her tendon reflexes, plantar responses and sensory examination were normal.

Investigations:

serum sodium	140 mmol/L (137–144)
serum potassium	2.9 mmol/L (3.5–4.9)
serum chloride	118 mmol/L (95–107)
serum bicarbonate	16 mmol/L (20–28)
serum creatinine	185 µmol/L (60–110)
serum adjusted calcium	2.05 mmol/L (2.20–2.60)
24-h urinary calcium	6.5 mmol (2.5–7.5)
urine pH	7.0

What is the most likely diagnosis?

Answers

A: Bartter syndrome
B: cystinuria
C: distal renal tubular acidosis
D: hyporeninaemic hypoaldosteronism
E: proximal renal tubular acidosis

Correct answer: C

Explanation

The results only fit with distal renal tubular acidosis (answer option C) or proximal renal tubular acidosis (answer option E). However, an increase in urinary calcium, stone formation and high urine pH all fit with distal renal tubular acidosis.

Question 13

B

Correct

A 28-year-old man was found to have protein 2+ on a routine urinalysis during a life insurance medical. His general practitioner confirmed this and referred him to the outpatient clinic. There had been a similar finding at his occupational health screen when he started at university. He had undergone further tests at the time and had been told there was “nothing to worry about”.

Physical examination was normal and his BP was 118/76 mmHg. Urinalysis showed protein 2+.

Investigations:

serum urea	5.6 mmol/L (2.5–7.0)
serum creatinine	92 µmol/L (60–110)
eGFR (CKD-EPI)	>60 mL/min/1.73 m^2 (>60)

urine protein:creatinine ratio (clinic sample)	103 mg/mmol (<30)
urine protein:creatinine ratio (early morning)	14 mg/mmol (<30)

What is the most appropriate next step in management?

Answers

A: blood tests to exclude renal inflammation
B: reassure the patient that he is at no increased risk of developing renal disease
C: regular blood tests because he is at risk of worsening renal function
D: renal biopsy to find out the cause of his proteinuria
E: start an ACE inhibitor

Correct answer: B

Explanation

This question demonstrates the usefulness of an early morning urine test to exclude the effects of postural variability in proteinuria. It has a good prognosis and does not require intervention or monitoring, hence reassurance is the most appropriate option (answer option B).

Question 14

A

Incorrect

A 78-year-old man presented with a 2-week history of ankle swelling and headache. He had a 4-year history of rheumatoid arthritis. His medication, which had remained unaltered for 3 years, comprised methotrexate 10 mg weekly, folic acid 5 mg daily and diclofenac 75 mg daily.

On examination, his BP was 188/122 mmHg. He had bilateral ankle oedema. There were chronic changes of rheumatoid arthritis in his hands, but no evidence of active synovitis. Examination of the optic fundi showed grade III hypertensive retinopathy.

Investigations:

serum creatinine	258 µmol/L (60–110)
serum albumin	33 g/L (37–49)
serum CRP	17 mg/L (<10)

24-h urinary total protein	2.4 g (<0.2)

What is the most likely diagnosis?

Answers

A: amyloidosis
B: analgesic nephropathy
C: hypertensive nephropathy
D: idiopathic membranous nephropathy
E: methotrexate nephrotoxicity

Correct answer: C

Explanation

This patient is most likely to have hypertensive nephropathy (answer option C) related to malignant hypertension. The history of rheumatoid arthritis and NSAID use is too short for amyloidosis (answer option A) or analgesic nephropathy (answer option B) to be likely. Idiopathic membranous nephropathy (answer option D) is very rarely associated with malignant hypertension. Methotrexate (answer option E) may cause a crystal nephropathy (when given in high dosages) but does not cause either malignant hypertension or heavy proteinuria.

Question 15

A

Incorrect

A 71-year-old man with IgA nephropathy was reviewed in the renal clinic. He complained of pain of recent onset in his right big toe. His renal function was stable and he was otherwise well. He was taking perindopril, amlodipine and levothyroxine.

On examination, he had swelling and erythema over the distal joint of his big toe. He was afebrile and did not look acutely ill. His BMI was 32.0 kg/m^2 (18.0–25.0).

Investigations:

serum creatinine	245 µmol/L (60–110)
serum urate	0.68 mmol/L (0.23–0.46)

A clinical diagnosis of gout was made.

What is the most appropriate treatment?

Answers

A: allopurinol
B: colchicine
C: diclofenac
D: febuxostat
E: probenecid

Correct answer: B

Explanation

This man has acute gout. Allopurinol (answer option A) and febuxostat (answer option D) should not be started during an acute attack. Diclofenac (answer option C) and probenecid (answer option E) are inappropriate because of his impaired renal function. It is most appropriate to try low-dose colchicine (answer option B) first.

Question 16

A

Incorrect

A 37-year-old man, who had received a living-unrelated kidney transplant from his wife 4 months previously, presented with melaena and fever. He had lost 10 kg in weight over the preceding month. His wife was positive for CMV and Epstein–Barr virus (EBV), and he was CMV and EBV negative. His medication comprised prednisolone, mycophenolate mofetil, tacrolimus and valganciclovir. One month previously, his serum creatinine had been 85 µmol/L (60–110). He continued to have melaena in hospital.

Investigations:

serum creatinine	150 µmol/L (60–110)
upper gastrointestinal endoscopy	normal
colonoscopy	normal
renal biopsy	dense infiltrate of mononuclear cells in the interstitium
CT scan of abdomen	enlarged right mesenteric lymph nodes and an area of thickening of small bowel wall

What is the most appropriate next step?

Answers

A: antithymocyte globulin
B: ganciclovir
C: methylprednisolone
D: mycophenolate mofetil reduction
E: rituximab

Correct answer: D
Explanation
The history and investigation findings suggest a diagnosis of post-transplant lymphoproliferative disorder associated with Epstein–Barr virus. Pending a definitive diagnosis, the most appropriate response is a reduction in immunosuppression. Reducing or withdrawing mycophenolate (answer option D) would be the most appropriate first step. Antiviral therapy is ineffective. Increasing immunosuppression will make the situation worse. Rituximab (answer option E) may form part of a chemotherapy regime in patients who do not respond to immunosuppression reduction once the diagnosis has been definitively made.

Question 17

A

Incorrect

A 23-year-old woman presented with a 2-month history of lethargy. She had no other symptoms and no past medical history. Her mother confirmed that she had been healthy as a child.

On examination, her BP was 178/110 mmHg. She had grade II hypertensive retinopathy but no other abnormalities. Urinalysis showed blood 3+, protein 4+.

Investigations:

serum creatinine	590 µmol/L (60–110)
urine protein:creatinine ratio	390 mg/mmol (<30)
ultrasound scan of kidneys	right kidney 6 cm, irregular outline; left kidney 7 cm, irregular outline

What is the most likely diagnosis?

Answers

A: chronic glomerulonephritis
B: congenital renal dysplasia
C: fibromuscular dysplasia of the renal arteries
D: hypertensive nephropathy
E: reflux nephropathy

Correct answer: E
Explanation

Reflux nephropathy (answer option E) is the most likely answer. The urinary abnormalities are not typical of congenital renal dysplasia (answer option B), fibromuscular dysplasia (answer option C) or hypertensive nephropathy (answer option D). Chronic glomerulonephritis (answer option A) is a possibility, but is a less common cause of a finding of small kidneys in a young woman.

Question 18

E

Incorrect

A 22-year-old woman attended for outpatient review and requested advice about family planning. She had ESRD secondary to renal dysplasia and had undergone pre-emptive transplantation 6 months previously. She had gained 6 kg in weight since her transplant and had not had any infections or episodes of rejection. Her current treatment comprised low-dose prednisolone, and tacrolimus titrated against trough levels.

Examination was normal. Her BP was 142/78 mmHg.

Investigations:

serum urea	7.8 mmol/L (2.5–7.0)
serum creatinine	116 µmol/L (60–110)
urine protein:creatinine ratio	28 mg/mmol (<30)

What is the most appropriate advice?

Answers

A: attempt to conceive without delay
B: avoid pregnancy because of risks to the fetus
C: delay conception for 6 months
D: introduce antihypertensive therapy before conception
E: substitute mycophenolate for tacrolimus before conception

Correct answer: C

Explanation

The Renal Association and British Transplantation Society guideline 'Post-operative care in the Kidney Transplant Recipient' (2017) (https://renal.org/wp-content/uploads/2017/06/FINAL-Post-Operative-Care-G...) suggests that pregnancy following a renal transplant should be delayed for a year and that the patient should have stable renal function and immunosuppressive medication with no evidence of ongoing rejection. Mycophenolate mofetil (answer option E) is teratogenic and should be avoided pre-conception, hence delay conception for 6 months (answer option C) is the correct answer.

Question 19

E

Incorrect

An 87-year-old woman, who had been undergoing regular haemodialysis for 5 years, developed infection in her arteriovenous fistula and subsequently developed infective endocarditis. The endocarditis was successfully treated with 6 weeks of intravenous antibiotics but she then

developed Clostridioides difficile (Clostridium difficile)-positive diarrhoea. This persisted for over 6 weeks, during which time she became malnourished and required nasogastric tube feeding. She also developed sacral and heel pressure sores. She asked the nurses if she could stop dialysis but her family did not wish her to stop.

What is the most appropriate next action?

Answers

A: continue to dialyse her as long as her relatives wish it
B: explore further with her the reasons behind her decision
C: obtain a formal psychiatric assessment
D: obtain legal advice
E: stop dialysis

Correct answer: B

Explanation

The correct answer is to explore further with the patient the reasons behind her decision (answer option B). In the UK, patients have the right to refuse life-sustaining treatment providing they have full mental capacity. Assessment of mental capacity does not require a formal psychiatric assessment (answer option C) and should be performed by the clinician responsible for the treatment; if they are confident that the patient has capacity, a legal opinion is not necessary (answer option D). The patient's relatives only have decision-making rights if the patient lacks capacity and has previously granted one or more of them a Lasting Power of Attorney for Health and Welfare.

Question 20

E

Correct

A 64-year-old woman presented with a 4-week history of intermittent pain and numbness in her left hand. She had noticed that her hand became pale at times, particularly in the cold. She had longstanding type 2 diabetes mellitus and mild leg claudication. She had started haemodialysis via a left brachial fistula 2 months previously. The symptoms in her left hand were worse during dialysis.

On examination, her left hand was paler than her right but all pulses were present and equal. The brachial fistula was working well. Pain and fine-touch sensation were reduced in the thumb and first two fingers of her left hand.

What is the most likely diagnosis?

Answers

A: carpal tunnel syndrome
B: cervical spondylosis
C: diabetic neuropathy
D: reflex sympathetic dystrophy
E: steal syndrome

Correct answer: E

Explanation

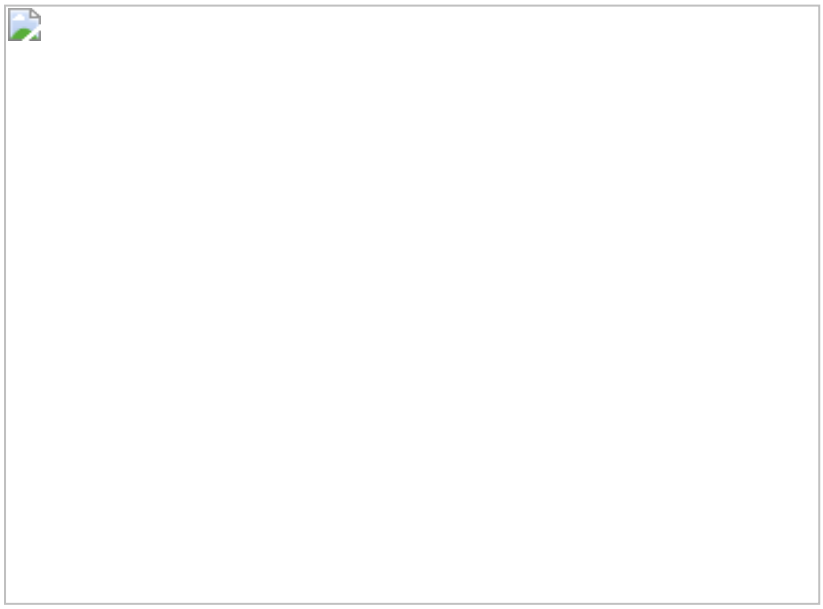
The history and examination describe features of distal hypoperfusion and ischaemia associated with arteriovenous fistula steal syndrome (answer option E), in a patient at risk (older patient with diabetes mellitus with a brachiocephalic arteriovenous fistula). The distractors are all associated with some of the features described but steal syndrome is consistent with chronology and all of the features described.

Question 21

E

Incorrect

A 60-year-old woman presented with painful discoloration of lower limb extremities (see image) and AKI. Four weeks previously, she had developed atrial fibrillation and had been treated with warfarin. Her renal function had previously been normal.



What is the most likely diagnosis?

Answers

A: cholesterol embolisation syndrome
B: cryoglobulinaemia
C: IgA nephropathy
D: IgA vasculitis
E: systemic small vessel vasculitis

Correct answer: A

Explanation

The recent initiation of treatment with warfarin and the image are typical of cholesterol embolisation syndrome (answer option A).

Question 22

E

Incorrect

A 55-year-old man with ESRD, who had been undergoing haemodialysis for 3 years, complained of generalised muscle stiffness and pain in his lower back. He had lost 4 kg in weight over the previous

4 months.

Clinical examination was unremarkable.

Investigations:

serum urea	32.0 mmol/L (2.5–7.0)
serum creatinine	1208 µmol/L (60–110)
serum adjusted calcium	2.52 mmol/L (2.20–2.60)
serum phosphate	3.10 mmol/L (0.80–1.45)
serum total protein	75 g/L (61–76)
serum albumin	39 g/L (37–49)
serum alkaline phosphatase	267 U/L (45–105)

plasma parathyroid hormone	70.0 pmol/L (0.9–5.4)

What is the most likely bone abnormality?

Answers

A: decreased bone mineralisation
B: decreased osteoblast activity
C: disrupted continuity of the trabeculae
D: increased osteoclast activity
E: thin osteoid seams

Correct answer: D
Explanation
This patient has secondary hyperparathyroidism as demonstrated by his elevated serum phosphate and parathyroid hormone levels. This is characterised by parathyroid hormone-driven increased osteoclastic activity (answer option D).

Question 23

E

Incorrect

A 32-year-old woman with a history of psychotic illness was referred for evaluation of asymptomatic hypokalaemia.

On examination, she was overweight. Her BP was 105/68 mmHg.

Investigations:

serum sodium	143 mmol/L (137–144)
serum potassium	2.9 mmol/L (3.5–4.9)
serum creatinine	60 µmol/L (60–110)
serum magnesium	0.70 mmol/L (0.75–1.05)

24-h urinary calcium	1.9 mmol (2.5–7.5)
24-h urinary potassium	60 mmol (25–120)

What is the most likely diagnosis?

Answers

A: Bartter syndrome
B: chronic self-induced vomiting
C: diuretic misuse
D: Gitelman syndrome
E: Liddle syndrome

Correct answer: D

Explanation

The combination of hypokalaemia, hypomagnesaemia, inappropriately high urinary potassium (suggesting renal potassium loss) and reduced urinary calcium excretion is diagnostic of Gitelman syndrome (answer option D). In patients with Bartter syndrome (answer option A), urinary calcium is normal or high.

Question 24

E

Incorrect

A 56-year-old woman was reviewed in the haemodialysis clinic. She complained of pain in her shoulders, knees and back. She had been undergoing dialysis for 7 years. Her medication comprised alfacalcidol 0.5 micrograms daily and calcium acetate 1 g with meals.

On examination, she had slight limitation of shoulder abduction and external rotation, but no joint effusions.

Investigations (pre-dialysis):

haemoglobin	98 g/L (115–165)
serum adjusted calcium	2.56 mmol/L (2.20–2.60)
serum phosphate	2.20 mmol/L (0.80–1.45)
serum alanine aminotransferase	29 U/L (5–35)
serum aspartate aminotransferase	33 U/L (1–31)
serum alkaline phosphatase	442 U/L (45–105)
serum gamma glutamyl transferase	36 U/L (4–35)
plasma parathyroid hormone	52.0 pmol/L (0.9–5.4)

What is the most appropriate next step in management of her hyperparathyroidism?

Answers

A: increase alfacalcidol dosage
B: parathyroidectomy

C: start pulsed alfacalcidol during dialysis
D: start sevelamer and stop calcium acetate
E: switch alfacalcidol to paricalcitol

Correct answer: B

Explanation

This patient had calcium levels in the high-normal range, a higher phosphate level and very high parathyroid hormone levels. The patient's alkaline phosphatase level was also very high and thus may explain her bone symptoms related with hyperparathyroidism. Options to increase alfacalcidol dosage (answer option A), start pulsed alfacalcidol during dialysis (answer option C) and switch alfacalcidol to paricalcitol (answer option E) may further increase calcium and phosphate levels. Starting sevelamer and stopping calcium acetate (answer option D) may not have a significant effect. The most appropriate step for the management of this patient is, therefore, parathyroidectomy (answer option B).

Question 25

E

Incorrect

A 64-year-old man undergoing maintenance haemodialysis was reviewed. Nine months previously, he had had a myocardial infarction. His medication comprised alfacalcidol 0.25 micrograms once daily, calcium carbonate 500 mg three times daily, ramipril 5 mg once daily, simvastatin 10 mg at night, aspirin 75 mg daily and subcutaneous epoetin beta 3000 units twice weekly.

Investigations:

haemoglobin	94 g/L (130–180)
white cell count	6.7×10^9/L (4.0–11.0)
platelet count	175×10^9/L (150–400)
serum ferritin	185 µg/L (15–300)

What is the most appropriate next step in management?

Answers

A: blood transfusion
B: change epoetin beta to darbepoetin alfa
C: increase dosage of epoetin beta
D: intravenous iron
E: stop ramipril

Correct answer: D

Explanation

The recommended answer of intravenous iron (answer option D) follows guidance; see: 'Anaemia management in patients with chronic kidney disease: a position statement by the Anaemia Working Group of European Renal Best Practice (ERBP)', Nephrology Dialysis Transplantation, Volume 24, Issue 2, 1 February 2009, pages 348–354, https://doi.org/10.1093/ndt/gfn653

'In the opinion of the ERBP Work Group, it appears reasonable to maintain the lower limit of the target, although the actual evidence for choosing this value is also very limited. On the basis of new

evidence, Hb values of 11–12 g/dl should be generally sought in the CKD population without intentionally exceeding 13 g/dl'.

'In 2006, and in light of patient safety, KDOQI defined the lower ferritin limit on the basis of CKD status (100 ng/ml in non-HD-CKD and 200 ng/ml in HD-CKD); if serum ferritin levels are >500 ng/ml, iron administration should be discouraged'.

Question 26

E

Incorrect

A 33-year-old woman had two children with cystinosis from her first marriage. She was planning to remarry and asked what the likelihood was of any children by her new partner developing or carrying the disease.

What is the most appropriate response?

Answers

A: 50% of all children will be affected
B: 50% of all children will be carriers
C: all female children will be carriers
D: all male children will be affected
E: no female children will be affected

Correct answer: B

Explanation

Cystinosis is a rare autosomal recessive condition, so each child she has with a new partner, assuming he is unlikely to be a carrier, has a 50% chance of carrying the gene (answer option B).

Question 27

E

Incorrect

A 37-year-old woman with a 4-year history of Raynaud's phenomenon, arthralgia, weight loss, muscle tenderness and intermittent malaise was referred by her general practitioner.

On examination, the patient had indurated thickening of the skin distal to the metacarpophalangeal joints. There was no active synovitis, rash or nail abnormalities. Her BP was 158/94 mmHg. She weighed 48 kg.

Investigations:

haemoglobin	110 g/L (115–165)
white cell count	4.0×10^9/L (4.0–11.0)
platelet count	135×10^9/L (150–400)
ESR	55 mm/1st h (<20)

serum urea	7.0 mmol/L (2.5–7.0)
serum creatinine	144 µmol/L (60–110)
serum creatine kinase	210 U/L (24–170)
serum CRP	42 mg/L (<10)
urine protein:creatinine ratio	105 mg/mmol (<30)
serum complement C3	74 mg/dL (65–190)
serum complement C4	22 mg/dL (15–50)
antinuclear antibodies	positive
extractable nuclear antigen (ENA) antibodies:	
anti-Ro antibodies	positive
anti-La antibodies	negative
anti-RNP antibodies	negative
anti-Scl-70 (topoisomerase I) antibodies	negative
anti-Sm antibodies	negative

What is the most likely diagnosis?

Answers

A: dermatomyositis
B: Sjögren's syndrome
C: systemic lupus erythematosus
D: systemic sclerosis
E: undifferentiated connective tissue disease

Correct answer: D

Explanation

This question describes a patient with a long history of Raynaud's phenomenon, hypertension, sclerodactyly, proteinuria, an elevated creatine kinase, and positive antinuclear antibodies and anti-Ro antibodies. The most likely cause of this constellation of features is systemic sclerosis (answer option D). The other distractors may be associated with some of the features described.

Question 28

E

Correct

A 67-year-old man with adult polycystic kidney disease, who had been undergoing haemodialysis for 7 years, had routine monthly blood tests. He was asymptomatic. His medication comprised sevelamer hydrochloride 2.4 g three times daily with meals, epoetin beta 8000 units per week subcutaneously, iron sucrose 50 mg intravenously per week, and vitamin B complex and vitamin C post-dialysis.

Investigations:

serum adjusted calcium	2.70 mmol/L (2.20–2.60)
serum phosphate	1.70 mmol/L (0.80–1.45)
plasma parathyroid hormone	78.0 pmol/L (0.9–5.4)

What is the most appropriate next step in management?

Answers

A: add aluminium hydroxide capsules before each meal
B: add daily oral alfacalcidol
C: add pulsed intravenous alfacalcidol
D: increase dosage of sevelamer hydrochloride
E: parathyroidectomy

Correct answer: E

Explanation

Adding aluminium hydroxide capsules before each meal (answer option A) and increasing the dosage of sevelamer hydrochloride (answer option D) are not needed as the patient's serum phosphate level is ok. Adding daily oral alfacalcidol (answer option B) or pulsed intravenous alfacalcidol (answer option C) would further increase the patient's adjusted calcium level. Parathyroidectomy (answer option E) is the only option that would help with the hyperparathyroid hormone.

Question 29

E

Incorrect

A 22-year-old woman was admitted by the obstetric service in week 30 of gestation during her first pregnancy. She had been treated with antibiotics for dysuria at 12 weeks. On admission, she complained of dysuria and suprapubic discomfort.

General examination was normal. Her temperature was 36.8°C, her pulse was 78 beats/min and her BP was 104/62 mmHg. There was no peripheral oedema and fundal height was appropriate.

Investigations:

haemoglobin	118 g/L (115–165)
white cell count	7.6×10^9/L (4.0–11.0)
serum urea	3.0 mmol/L (2.5–7.0)
serum creatinine	46 µmol/L (60–110)
serum CRP	8 mg/L (<10)
midstream urine microscopy:	
white cells	>50/µL (<10)
culture	$>10^5$ Escherichia coli per mL, sensitive

	to amoxicillin, ciprofloxacin, trimethoprim
ultrasound scan of renal tract	minimal right hydronephrosis

What is the most appropriate next investigation?

Answers

A: DTPA isotope renography
B: monthly midstream urine cultures
C: MR urography
D: retrograde pyelography
E: urodynamic study

Correct answer: B

Explanation

The appearance of hydronephrosis is a normal finding in pregnancy and does not need further investigation. The patient needs regular midstream urine cultures (answer option B).

Question 30

E

Incorrect

A 70-year-old man with hypertension was admitted with a 7-day history of worsening confusion. His wife reported that, over a 6-month period, he had had a 13-kg weight loss, anorexia, and vomiting after food.

On examination, he had reduced skin turgor. His BP was 120/75 mmHg and his respiratory rate was 12 breaths/min. His Glasgow coma score was 12.

Investigations:

serum sodium	128 mmol/L (137–144)
serum potassium	2.5 mmol/L (3.5–4.9)
serum chloride	75 mmol/L (95–107)
serum bicarbonate	48 mmol/L (20–28)
serum urea	34.0 mmol/L (2.5–7.0)
serum creatinine	200 µmol/L (60–110)
serum osmolality	300 mosmol/kg (278–300)
urine pH	5.8
urinary sodium	5 mmol/L
urine osmolality	650 mosmol/kg (100–1000)
serum cortisol (09.00 h)	650 nmol/L (200–700)

What is the most likely diagnosis?

Answers

A: addisonian crisis
B: Bartter syndrome
C: distal renal tubular acidosis
D: pyloric stenosis
E: syndrome of inappropriate antidiuretic hormone secretion

Correct answer: D

Explanation

This patient has a significant hypochloraemic metabolic alkalosis with dehydration resulting from severe and prolonged vomiting, most likely caused by a pyloric stenosis (answer option D). All the other distractors are associated with other biochemical abnormalities.

Question 31

E

Incorrect

A 78-year-old man presented with a 3-month history of malaise.

On examination, his BP was 135/72 mmHg.

Investigations:

haemoglobin	100 g/L (130–180)

serum sodium	133 mmol/L (137–144)
serum potassium	6.4 mmol/L (3.5–4.9)
serum creatinine	608 µmol/L (60–110)

ultrasound scan of kidneys	grossly hydronephrotic right kidney with thin cortex; left kidney with moderate hydronephrosis but otherwise normal appearance

What is the most appropriate next step in management?

Answers

A: percutaneous nephrostomy of the left kidney
B: percutaneous nephrostomy of the right kidney
C: retrograde ureteric stent on the left
D: retrograde ureteric stent on the right
E: urgent dialysis

Correct answer: A

Explanation

The patient needs urgent relief of the obstruction or he will need dialysis. The left kidney appears to be viable, so left nephrostomy (answer option A) has a good chance of improving function and

avoiding dialysis. It is unlikely that a surgeon would be prepared to insert a stent under general anaesthetic when the patient's potassium level is 6.4 mmol/L.

Question 32

E

Incorrect

A 33-year-old woman presented with a 1-week history of malaise and a 3-day history of a rash on her legs. She had no significant past medical history and was not taking any regular medication.

Examination was normal except for a palpable purpuric rash over her legs. Urinalysis showed blood 3+, protein 3+.

Investigations:

serum creatinine	776 µmol/L (60–110)
serum CRP	226 mg/L (<10)
urine albumin:creatinine ratio	136.0 mg/mmol (<3.5)
ultrasound scan of kidneys	normal

A renal biopsy was performed. The light microscopic appearance of a typical glomerulus is shown (see image A). Immunofluorescence (IF) for IgA is shown (see image B); a similar pattern was seen for IgG and complement C3. IF for other immunoglobulins and complement components was negative.

Image A

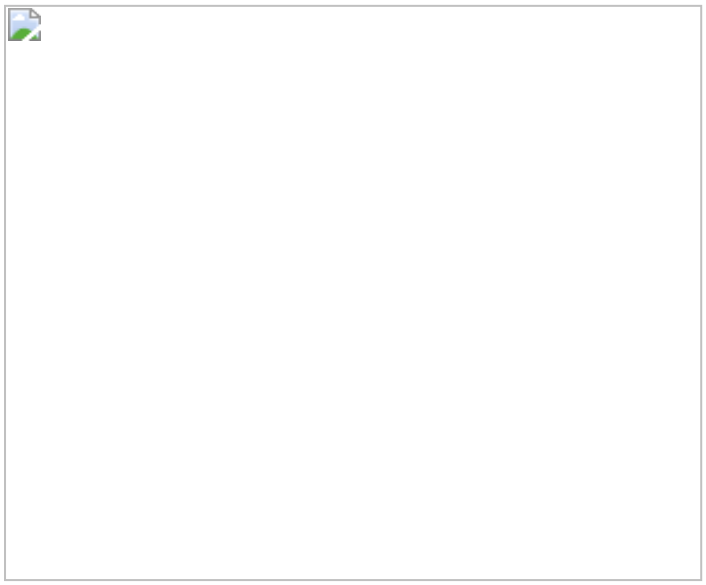
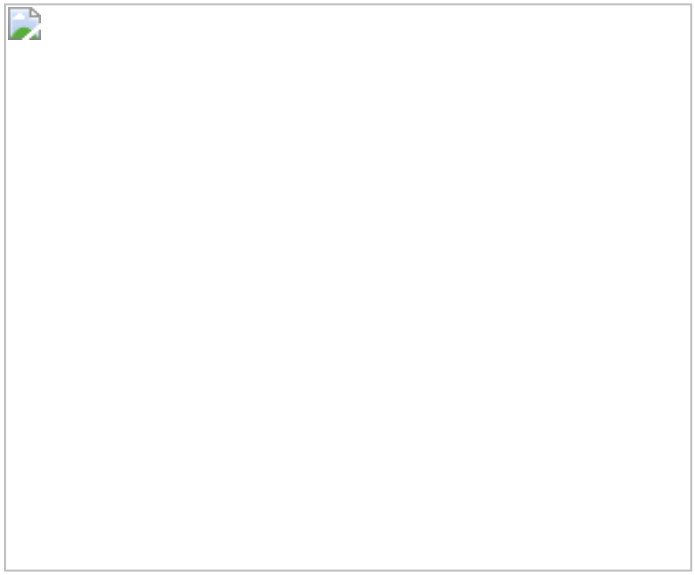


Image B



What is the most likely diagnosis?

Answers

A: cryoglobulinaemia
B: IgA vasculitis
C: microscopic polyangiitis
D: polyarteritis nodosa
E: systemic lupus erythematosus

Correct answer: B

Explanation

This patient has IgA vasculitis (answer option B). Staining is confined to the mesangium and glomerular capillary walls. Concomitant staining for IgG is reported in 15–90% of case series. Minimal immunofluorescence staining is typical of microscopic polyangiitis (answer option C) and polyarteritis nodosa (answer option D). The immunofluorescence features are not typical of lupus nephritis (answer option E) or cryoglobulinaemia (answer option A).

Question 33

E

Incorrect

A 55-year-old man presented with left ureteric colic. He later passed a stone, and analysis showed it to be composed of calcium oxalate. He had experienced no previous symptomatic nephrolithiasis and had no other past medical history.

Investigations:

serum adjusted calcium	2.35 mmol/L (2.20–2.60)
serum urate	0.40 mmol/L (0.23–0.46)
24-h urinary calcium	8.5 mmol (2.5–7.5)
24-h urinary urate	1.6 mmol (<3.6)
24-h urinary oxalate	0.30 mmol (0.14–0.46)

What is the most appropriate way to prevent further stone formation?

Answers

A: alkalinisation of the urine
B: restriction of dietary calcium
C: restriction of dietary oxalate
D: restriction of dietary sodium
E: supplementation with magnesium

Correct answer: D

Explanation

Increased fluid intake and restriction of dietary sodium intake (answer option D) are the most important interventions in reducing the risk of further calcium oxalate stone formation. Dietary sodium restriction will reduce urinary calcium excretion. Restricting dietary calcium intake (answer option B) may actually increase oxalate absorption from the gut and be counterproductive.

Question 34

E

Correct

A 39-year-old man presented with rigors. Three weeks previously, he had undergone simultaneous kidney and pancreas transplantation for ESRD secondary to type 1 diabetes mellitus. Exocrine secretions from the donor pancreas had been drained via the bladder. He had attained immediate renal allograft function and, on the fifth postoperative day, his serum creatinine had been 100 µmol/L (60–110).

On examination, his temperature was 38.0°C and his oxygen saturation was 96% (94–98) breathing air. His renal graft was non-tender. Auscultation of his chest was normal. Urinalysis showed blood 2+, protein 2+, leukocytes 3+, nitrites positive.

Investigations:

haemoglobin	110 g/L (130–180)
white cell count	13.2×10^9/L (4.0–11.0)
serum creatinine	127 µmol/L (60–110)
random plasma glucose	9.6 mmol/L (3.0–11.1)
serum amylase	178 U/L (60–180)

What is the most likely diagnosis?

Answers

A: acute transplant rejection
B: BK virus infection
C: CMV infection
D: leak at the vesicopancreatic anastomosis
E: urinary sepsis

Correct answer: E

Explanation

The most likely problem at this stage post-transplantation is sepsis, especially urinary (answer option E).

Question 35

E

Incorrect

A 35-year-old man was reviewed in the haemodialysis clinic. He was undergoing regular dialysis via a left forearm fistula. He was feeling more tired than usual but had no other new symptoms. On a 4-hour, three times per week regimen, his interdialytic weight gains were in the range of 1–2 kg. His current medication comprised ramipril 5 mg once daily, long-acting nifedipine 90 mg once daily, sevelamer 800 mg three times daily and epoetin beta 6000 units weekly.

On examination (pre-dialysis), his BP was 155/95 mmHg. There was no peripheral oedema. The rest of the examination was normal.

Investigations (at review):

pre-dialysis serum potassium	5.2 mmol/L (3.5–4.9)
pre-dialysis serum creatinine	940 µmol/L (60–110)
pre-dialysis serum phosphate	2.10 mmol/L (0.80–1.45)
urea reduction ratio	60%
blood pump speed	250 mL/min
dialysate flow rate	800 mL/min
fistula flow rate	740 mL/min
dynamic fistula arterial pressure	–150 mmHg
dynamic venous pressure	+125 mmHg

What is the most appropriate next step in management?

Answers

A: increase blood pump speed
B: increase dialysate flow rate
C: increase dialysis time
D: investigate for fistula inflow stenosis
E: investigate for fistula venous stenosis

Correct answer: A

Explanation

The patient's blood pump speed is well below the maximum that can be achieved with a good arteriovenous fistula (AVF) (350–400mL/min) and will result in the low urea reduction ratio (URR). This can be readily increased with a beneficial impact on the URR (answer option A). Increasing

dialysis time (answer option C) would also increase the URR but introduces logistical difficulties and costs, not to mention inconvenience for patients. The dialysis flow rates are close to maximum and parameters provided do not suggest a problem with the AVF.

Question 36

E

Incorrect

A 49-year-old black woman from Zimbabwe presented with a 4-week history of peripheral oedema and shortness of breath. She was HIV positive and had just started highly active antiretroviral therapy.

On examination, her BP was 138/74 mmHg.

Investigations:

haemoglobin	105 g/L (115–165)
platelet count	120 × 10^9/L (150–400)
serum sodium	134 mmol/L (137–144)
serum potassium	4.3 mmol/L (3.5–4.9)
serum urea	9.0 mmol/L (2.5–7.0)
serum creatinine	187 µmol/L (60–110)
eGFR (CKD-EPI)	37 mL/min/1.73 m^2 (>60)
serum albumin	28 g/L (37–49)
urine protein:creatinine ratio	375 mg/mmol (<30)
serum complement C3	76 mg/dL (65–190)
serum complement C4	19 mg/dL (15–50)

What is the most likely diagnosis?

Answers

A: focal segmental glomerulosclerosis
B: interstitial nephritis
C: membranous glomerulonephritis
D: minimal change disease
E: thrombotic thrombocytopenic purpura

Correct answer: A

Explanation

Thrombotic thrombocytopenic purpura (answer option E) is not supported by the data, renal impairment suggests that minimal change disease (answer option D) is incorrect, and the proteinuria suggests that interstitial nephritis (answer option B) is also incorrect. Focal segmental glomerulosclerosis (answer option A) is more likely than option C given the patient's ethnicity.

Question 37

E

Incorrect

A 76-year-old woman with ESRD resulting from type 2 diabetes mellitus had been undergoing CAPD for 18 months. Her current dry weight was 76 kg. She passed less than 200 mL of urine per 24 hours. Her current regimen was three 2-L bags containing glucose 1.36% during the day and one 2-L bag containing glucose 2.27% overnight.

She contacted the renal unit very infrequently and there were usually no problems when her community dialysis sister visited her at home.

Investigations:

adequacy studies:	
weekly Kt/V	1.57
weekly creatinine clearance	48 L/1.73 m^2

peritoneal equilibration test:	
4-h dialysate:plasma (DP) ratio	0.48 (low)

What is the best way to improve dialysis adequacy?

Answers

A: change overnight exchange to icodextrin
B: increase daytime glucose concentration to 2.27%
C: increase dwell volume to 2.5 L
D: increase to five daily exchanges
E: transfer to APD

Correct answer: C

Explanation

Small solute clearance needs to be increased and increasing dwell volume to 2.5 L (answer option C) is the only one that will do that in a patient who is a low transporter. Options to increase to five daily exchanges (answer option D) and transfer to APD (answer option E) would help in a high transporter, and change overnight exchange to icodextrin (answer option A) and increase daytime glucose concentration to 2.27% (answer option B) would help ultrafiltration but not clearances.

Question 38

E

Incorrect

A 44-year-old man was seen in the renal clinic. Ten days previously, he had passed a small stone in his urine after 36 hours of right loin pain and one episode of visible haematuria. Since passing the stone he had experienced no further symptoms. He gave no past history of stones, and there was no family history of renal stones.

What is the most likely composition of the passed stone?

Answers

A: calcium carbonate
B: calcium oxalate
C: calcium phosphate
D: magnesium ammonium phosphate
E: uric acid

Correct answer: B

Explanation

Calcium oxalate (answer option B) is the commonest composition of idiopathic renal stones. Calcium carbonate (answer option A) and phosphate (answer option C) are usually minor components within stones. The other stone compositions are relevant with recurrent calculi or predisposing factors

Question 39

E

Incorrect

An 80-year-old woman was admitted for management of bowel obstruction associated with a large incisional hernia. She was assessed by the nephrology team 2 days postoperatively because she was oliguric. She had a history of ischaemic heart disease, type 2 diabetes mellitus and CKD.

Investigations:

serum sodium	134 mmol/L (137–144)
serum potassium	6.9 mmol/L (3.5–4.9)
serum chloride	98 mmol/L (95–107)
serum bicarbonate	12 mmol/L (20–28)
serum urea	34.0 mmol/L (2.5–7.0)
serum creatinine	400 µmol/L (60–110)
arterial blood gases, breathing air:	
PO_2	7.6 kPa (11.3–12.6)
PCO_2	7.3 kPa (4.7–6.0)

Which acid–base disorders are most likely to be present?

Answers

A: respiratory acidosis and metabolic alkalosis
B: respiratory acidosis and normal anion gap metabolic acidosis
C: respiratory acidosis and raised anion gap metabolic acidosis
D: respiratory alkalosis and metabolic alkalosis
E: respiratory alkalosis and raised anion gap metabolic acidosis

Correct answer: C

Explanation

The patient's low bicarbonate level indicates metabolic acidosis and the anion gap is high. In that context the PCO_2 level is also too high, indicating respiratory acidosis (answer option C).

Question 40

E

Correct

A 34-year-old woman with CKD resulting from IgA nephropathy was hoping to become pregnant. She wanted to know the likelihood that she would have a healthy infant. She was taking labetalol to control her BP.

On examination, her BP was 126/78 mmHg.

Investigations:

serum creatinine	120 µmol/L (60–110)

urine protein:creatinine ratio	86 mg/mmol (<30)

What is the likelihood of a successful obstetric outcome?

Answers

A: 10%
B: 25%
C: 50%
D: 75%
E: 90%

Correct answer: E

Explanation

At that level of renal function a successful outcome is very likely (answer option E).

Question 41

E

Incorrect

A 67-year-old man presented to the emergency department with a 24-hour history of vomiting and reduced fluid intake. He had passed no urine for 12 hours. Three years previously, he had undergone right nephroureterectomy because of urothelial malignancy.

On examination, his pulse was 100 beats/min, his BP was 125/66 mmHg and his respiratory rate was 28 breaths/min. His chest was clear to auscultation and abdominal examination was unremarkable.

He was administered 2 L of sodium chloride 0.9% intravenously. He remained anuric.

Investigations:

haemoglobin	126 g/L (130–180)

serum urea	34.7 mmol/L (2.5–7.0)
serum creatinine	586 µmol/L (60–110)
serum bicarbonate	11 mmol/L (20–28)
serum CRP	23 mg/L (<10)
ultrasound scan of renal tract	absent right kidney; left kidney normal size; no hydronephrosis seen; bladder not distended

What is the most likely cause of his AKI?

Answers

A: acute tubular necrosis
B: obstructive uropathy
C: pre-renal uraemia
D: rapidly progressive glomerulonephritis
E: renal artery occlusion

Correct answer: B

Explanation

In the situation of a single kidney and known history of urothelial malignancy (or other obstructing pathology) it is important to exclude obstruction as the cause of AKI. If urine production is low the calyx may not initially distend to generate the picture of hydronephrosis on ultrasound scan. He was not obviously volume-depleted and there was no response to a fluid challenge, making answer options A and C unlikely. The history is not typical of either D or E, which leaves obstruction (answer option B) as the most likely cause.

Question 42

E

Incorrect

A 25-year-old dancer presented with ankle swelling that had been worsening over the previous few weeks. She thought this was caused by a dancing-related injury and had been taking a variety of analgesics.

On examination, she was thin. Her BP was 135/84 mmHg, and there was bilateral ankle oedema. There was a soft ejection systolic murmur at the left sternal edge. JVP was not elevated and chest examination was normal. Urinalysis showed blood 4+, protein 3+.

Investigations:

serum creatinine	212 µmol/L (60–110)
serum albumin	28 g/L (37–49)
serum CRP	5 mg/L (<10)

urine protein:creatinine ratio	462 mg/mmol (<30)

serum complement C3	75 mg/dL (65–190)
serum complement C4	42 mg/dL (15–50)

ANCA	negative

What is the most likely cause of her impaired renal function?

Answers

A: acute post-infectious glomerulonephritis
B: IgA nephropathy
C: infective endocarditis
D: interstitial nephritis
E: papillary necrosis

Correct answer: B

Explanation

The patient has nephrotic range proteinuria, renal impairment and an active urinary sediment. There is nothing to suggest infective endocarditis (answer option C), interstitial nephritis (answer option D) or papillary necrosis (answer option E) would present this way. The patient's serum complement is normal and there is no medical history of infection, so IgA nephropathy (answer option B) is the best answer.

Question 43

E

Incorrect

A 34-year-old man was referred urgently to the renal clinic with newly identified renal impairment. For the previous 4 weeks, he had been feeling generally unwell with joint pains, and had become short of breath when climbing stairs.

On examination, his temperature was 37.3°C, his pulse was 92 beats/min and his BP was 105/50 mmHg. His JVP was not raised. Auscultation of his chest showed an early diastolic murmur and scattered crackles at both lung bases. There was a trace of ankle oedema. There was no rash. Urinalysis showed blood 4+, protein 3+.

Investigations:

haemoglobin	128 g/L (130–180)

serum urea	12.5 mmol/L (2.5–7.0)
serum creatinine	231 µmol/L (60–110)

What is the most important next investigation?

Answers

A: ANCA

B: antistreptolysin O antibodies
C: blood cultures
D: renal biopsy
E: ultrasound scan of kidneys

Correct answer: C
Explanation
The clinical picture suggests aortic incompetence with AKI and probable left ventricular failure. Urinalysis suggests the AKI is because of glomerulonephritis. The most likely unifying diagnosis is infective endocarditis making blood cultures (answer option C) the best answer. The other options may all be appropriate in the investigation of AKI but failure to recognise heart disease, the possibility of endocarditis and taking blood cultures would represent a clinical error.

Question 44

E

Incorrect

A 20-year-old man with nephrotic syndrome caused by biopsy-proven minimal change disease was reviewed. He had been treated for 8 weeks with a daily dose of prednisolone 1 mg/kg. He was well but remained oedematous.

Investigations:

serum creatinine	78 µmol/L (60–110)
serum albumin	20 g/L (37–49)
urine protein:creatinine ratio	890 mg/mmol (<30)

What is the most appropriate next step in management?

Answers

A: ciclosporin
B: continue current treatment
C: levamisole
D: mycophenolate mofetil
E: rituximab

Correct answer: B
Explanation
Eight weeks is not long enough to be sure whether the patient will respond to corticosteroids. It would be reasonable to continue 1 mg/kg prednisolone for up to 4 months before considering alternatives, so continue current treatment (answer option B) is correct.

Question 45

E

Incorrect

An 18-year-old man with a strong family history of adult polycystic kidney disease (PKD) requested ultrasound screening for the condition as he wished to become a professional boxer. He had four affected and five unaffected relatives who were all available for genetic testing if necessary.

An ultrasound scan showed three cysts measuring between 0.5 and 1 cm in diameter in the left kidney; the right kidney appeared normal.

What further investigation is required to confirm or refute the diagnosis of adult PKD?

Answers

A: CT scan of kidneys
B: direct DNA analysis
C: genetic linkage analysis for PKD genes
D: none needed
E: repeat ultrasound scan at 21 years of age

Correct answer: D

Explanation

In a patient of this age, with a positive family medical history, the presence of three cysts (either unilateral or bilateral) is diagnostic of polycystic kidney disease. Hence, no further investigation is needed (answer option D).

Question 46 D Correct

A 23-year-old woman was found to have haematuria and proteinuria at 30 weeks of her second pregnancy.

On examination, her BP was 150/90 mmHg compared with 110/75 mmHg at 20 weeks. She had mild facial and ankle oedema.

Investigations:

haemoglobin	100 g/L (115–165)
white cell count	2.5 × 10^9/L (4.0–11.0)
platelet count	150 × 10^9/L (150–400)
prothrombin time	15.0 s (11.5–15.5)
serum creatinine	120 µmol/L (60–110)
serum albumin	25 g/L (37–49)
serum total bilirubin	18 µmol/L (1–22)
serum urate	0.30 mmol/L (0.19–0.36)
24-h urinary total protein	6.0 g (<0.2)
urine microscopy:	
red cell count	>50/µL (0)

What is the most likely diagnosis?

Answers

A: HELLP syndrome
B: minimal change disease
C: pre-eclampsia
D: systemic lupus erythematosus
E: thrombotic thrombocytopenic purpura

Correct answer: D

Explanation

The patient has systemic lupus erythematosus (answer option D) because of her active urinary sediment, hypertension and normal platelets. HELLP (answer option A) and thrombotic thrombocytopenic purpura (answer option E) are less likely as the patient's platelet level would usually be much lower. Minimal change disease (answer option B) rarely causes haematuria. Pre-eclampsia (answer option C) is unlikely in a patient with a normal serum urate level.

Question 47

C

Incorrect

A 35-year-old woman presented with muscle weakness of a few days' duration.

On examination, she had a flaccid paralysis. There was no sensory neuropathy. Her BP was 100/70 mmHg. Urinalysis was normal.

Investigations:

serum sodium	136 mmol/L (137–144)
serum potassium	1.9 mmol/L (3.5–4.9)
serum chloride	117 mmol/L (95–107)
serum bicarbonate	13 mmol/L (20–28)
serum urea	4.9 mmol/L (2.5–7.0)
serum creatinine	92 µmol/L (60–110)
urine pH	6.5

What is the most likely cause of the biochemical disturbance?

Answers

A: bulimia
B: diarrhoea
C: diuretic misuse
D: laxative misuse
E: renal tubular acidosis

Correct answer: E

Explanation

The presence of a hyperchloraemic, hypokalaemic metabolic acidosis best fits a diagnosis of renal tubular acidosis (answer option E). Diarrhoea (answer option B), diuretic misuse (answer option C)

and laxative misuse (answer option D) would not give the hyperchloraemic acidosis or give rise to a higher urea. Bulimia (answer option A) would give hypochloraemic alkalosis.

Question 48

E

Incorrect

A 72-year-old woman was referred to the renal clinic. She had a 4-month history of fatigue, altered taste, loss of smell, and nausea. She had a 3-week history of myalgia and complained of weakness and paraesthesia in her right thumb, index and middle fingers. She had a history of asthma, nasal polyps, and hypertension. She had been taking ibuprofen, bendroflumethiazide, salbutamol, salmeterol and fluticasone.

On examination, her BP was 148/88 mmHg. There was scattered polyphonic wheeze throughout both lung fields. She had weakness in thumb abduction and flexion of the distal phalanx of her index and middle fingers on the right. Urinalysis showed blood 3+, protein 3+.

Investigations (current):

haemoglobin	107 g/L (115–165)
white cell count	21.5 × 10^9/L (4.0–11.0)
neutrophil count	8.9 × 10^9/L (1.5–7.0)
eosinophil count	9.40 × 10^9/L (0.04–0.40)
platelet count	823 × 10^9/L (150–400)

serum urea	15.8 mmol/L (2.5–7.0)
serum creatinine	217 µmol/L (60–110)

Investigations (2 weeks before presentaton):

serum urea	8.3 mmol/L (2.5–7.0)
serum creatinine	94 µmol/L (60–110)

What is the most likely diagnosis?

Answers

A: eosinophilic granulomatosis with polyangiitis
B: granulomatosis with polyangiitis
C: interstitial nephritis
D: polyarteritis nodosa
E: systemic lupus erythematosus

Correct answer: A

Explanation

The patient has rapidly deteriorating renal function with an active urinary sediment, strongly suggesting glomerulonephritis. She has symptoms to suggest mononeuritis multiplex and an eosinophilia, making eosinophilic granulomatosis with polyangiitis (answer option A) the most likely diagnosis.

Question 49

E

Correct

A 23-year-old previously healthy man was found to have proteinuria 3+ on a routine annual check-up. He noted that he never sweated even in the hottest weather and that he had intermittent paraesthesiae in his fingers and toes. His maternal uncle had died suddenly at the age of 42.

On examination, there were no rashes. His BP was 128/76 mmHg. There was reduced sensation to soft touch and pinprick in the distal and proximal phalanges of his hands and feet. Urinalysis showed protein 3+.

Investigations:

serum creatinine	74 µmol/L (60–110)
24-h urinary total protein	2.4 g (<0.2)
urine microscopy	no cells, crystals or casts

A renal biopsy was performed.

What is the most likely histological finding on light microscopy?

Answers

A: basement membrane reduplication
B: endocapillary proliferation
C: mesangial hypercellularity
D: no abnormality
E: podocyte vacuolation

Correct answer: E

Explanation

This patient has features of Fabry disease (hypohidrosis and acroparasthesiae), an X-linked disorder of glycosphingolipid metabolism. Sudden death at a young age is caused by cardiac conduction defects. Podocyte vacuolation (answer option E) is a common finding on renal biopsy, consistent with the described distribution of glycolipid deposition in the kidney.

Question 50

E

Incorrect

A 52-year-old man with CKD stage 4 secondary to diabetes mellitus attended the outpatient clinic complaining of increased lethargy and breathlessness.

On examination, his BP was 140/72 mmHg and he appeared pale.

Investigations:

haemoglobin	106 g/L (130–180)
platelet count	164 × 10^9/L (150–400)
serum ferritin	95 µg/L (15–300)
transferrin saturation	19% (20–50)
serum sodium	141 mmol/L (137–144)
serum potassium	5.4 mmol/L (3.5–4.9)
serum creatinine	323 µmol/L (60–110)
eGFR (CKD-EPI)	21 mL/min/1.73 m^2 (>60)

What is the most appropriate next step in management?

Answers

A: erythropoiesis-stimulating agent
B: intravenous iron
C: observe for 3 months
D: oral ascorbic acid
E: refer for endoscopy

Correct answer: B

Explanation

This patient has anaemia associated with CKD. The presence of symptoms is an indication for initiation of treatment. His serum ferritin is less than 100 µg/L, but more importantly, his transferrin saturation is <20%, suggesting iron deficiency. This should be corrected before consideration of an erythropoiesis-stimulating agent (answer option A). Most clinicians would recommend intravenous iron (answer option B) over oral iron in this situation. There is no evidence to support the use of ascorbic acid (answer option D).

Question 51

E

Incorrect

A 45-year-old man with chronic hepatitis C complained of joint pain.

On examination, he had a purpuric rash on his legs. Urinalysis showed blood 2+, protein 2+.

Investigations:

serum creatinine	90 µmol/L (60–110)
serum CRP	60 mg/L (<10)
serum complement C3	50 mg/dL (65–190)
serum complement C4	9 mg/dL (15–50)

What is the most likely diagnosis?

Answers

A: amyloidosis
B: cryoglobulinaemia
C: polyarteritis nodosa
D: post-infectious glomerulonephritis
E: systemic lupus erythematosus

Correct answer: B

Explanation

This patient has hypocomplementaemia with a particularly low C4, suggesting activation of the classical complement pathway. Urinalysis suggests a nephritic picture. The patient has hepatitis C infection, which is associated with cryoglobulinaemia (answer option B). No evidence is given to support a diagnosis of either systemic lupus erythematosus (answer option E) or post-infectious glomerulonephritis (answer option D). Polyarteritis nodosa (answer option C) is associated with hepatitis B infection. Cryoglobulinaemia is the most likely answer.

Question 52

E

Incorrect

A 49-year-old man with ESRD who was currently being treated with haemodialysis presented at the dialysis clinic with reduced libido and erectile dysfunction. He had no previous history of neurologic or endocrine problems. He was dialysing effectively with a urea reduction ratio of 75%. He was taking sevelamer, alfacalcidol and darbepoetin alfa therapy only.

On examination, his BP was 132/82 mmHg.

Investigations:

haemoglobin	126 g/L (130–180)
serum sodium	143 mmol/L (137–144)
serum potassium	4.4 mmol/L (3.5–4.9)
serum urea (post dialysis)	12.0 mmol/L (2.5–7.0)
serum creatinine	323 µmol/L (60–110)
serum testosterone	9.0 nmol/L (9.0–35.0)
serum follicle-stimulating hormone	8.6 U/L (1.0–7.0)
serum luteinising hormone	14.0 U/L (1.0–10.0)

What is the most appropriate next step in management?

Answers

A: bromocriptine tablets
B: intracavernosal injections
C: phosphodiesterase-5 inhibitor tablets
D: testosterone patches
E: zinc

Correct answer: C

Explanation

Phosphodiesterase-5 inhibitors (answer option C) are a first-line drug when there are no contraindications or clear correctable causes. ESRD does not specifically change this approach. Testosterone therapy (answer option D) is most effective if testosterone levels are <8.0 nmol/L. There is no evidence that bromocriptine (answer option A) or zinc (answer option E) have any effect on symptoms.

Question 53

E

Incorrect

A 21-year-old man was referred after he registered with a new general practitioner. At the age of 14, he had been found to have non-visible haematuria on a routine urinalysis. A renal biopsy had been discussed but had been declined. He had not attended for follow-up. There was no family history of renal disease.

On examination, he appeared well. His BP was 117/68 mmHg. Urinalysis confirmed non-visible haematuria but showed no other abnormality.

Investigations:

serum urea	4.6 mmol/L (2.5–7.0)
serum creatinine	77 µmol/L (60–110)
urine albumin: creatinine ratio	3.3 mg/mmol (<2.5)

What is the most appropriate next step in management?

Answers

A: 24-h urinary collection for protein
B: annual review in primary care
C: Ham test
D: renal biopsy
E: ultrasound scan of kidneys

Correct answer: B

Explanation

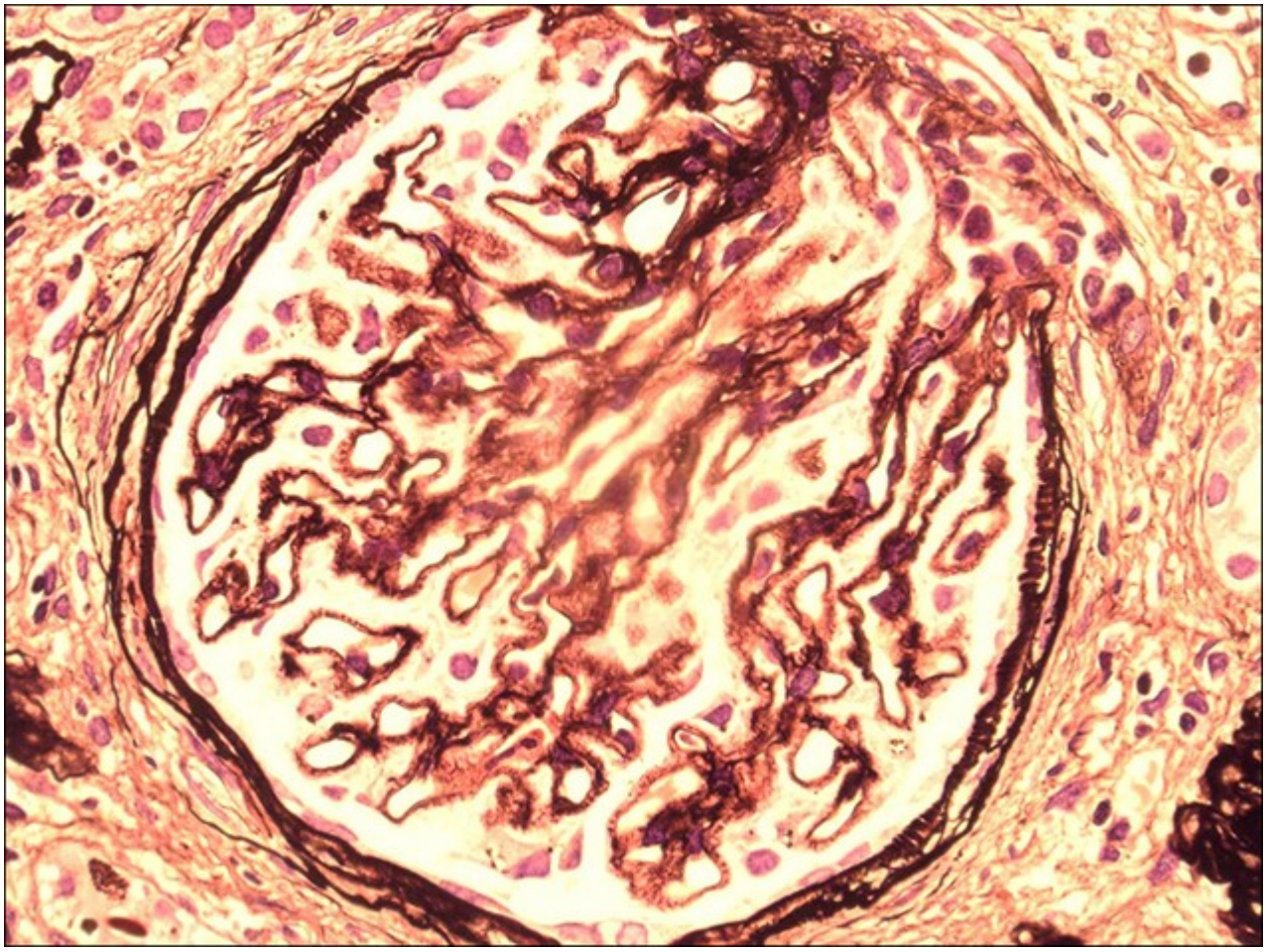
The stem describes a young man with non-visible haematuria present for at least 7 years associated with preserved renal excretory function and in the absence of hypertension. The urine albumin:creatinine ratio is only marginally elevated. The risks of renal biopsy (answer option D) would be hard to justify in this context and a 24-h urinary collection (option A) will not influence the management plan. Ultrasound scan of the kidneys (option E) is unlikely to identify a morphological abnormality to explain the finding of non-visible haematuria. Ham test (acidified serum lysis) (option C) is performed in pursuit of the diagnosis of paroxysmal nocturnal haemoglobinuria, a condition associated with visible changes in urine colour due to red cell haemolysis. Annual review of this patient (answer option B) is the most appropriate management.

Question 54

D

Incorrect

A 36-year-old woman with systemic lupus erythematosus attended the outpatient clinic after developing ankle swelling and heavy proteinuria on dipstick urinalysis. Twelve years previously, she had been treated with prednisolone and pulsed intravenous cyclophosphamide for diffuse proliferative lupus nephritis. She was admitted and underwent renal biopsy (see image for a silver stain representative of the whole biopsy).



What is the International Society of Nephrology/Renal Pathology Society classification of this biopsy appearance?

Answers

A: class I
B: class II
C: class III
D: class IV
E: class V

Correct answer: E

Explanation

Class V (answer option E) lupus nephritis (membranous) often presents with heavy proteinuria and nephrotic syndrome, which it sounds as though this patient has. Lupus nephritis can switch class. The image shows the classic appearance of ‘spikes’ on silver stain, where areas of the glomerular basement membrane are seen in between areas of immune complex deposition.

Question 55

E

Incorrect

A 76-year-old man was admitted with breathlessness. He had a history of hypertension and COPD. Over the previous 3 months, he had had recurrent chest infections treated with a variety of antibiotics. His regular medication comprised oral ramipril and inhaled salmeterol.

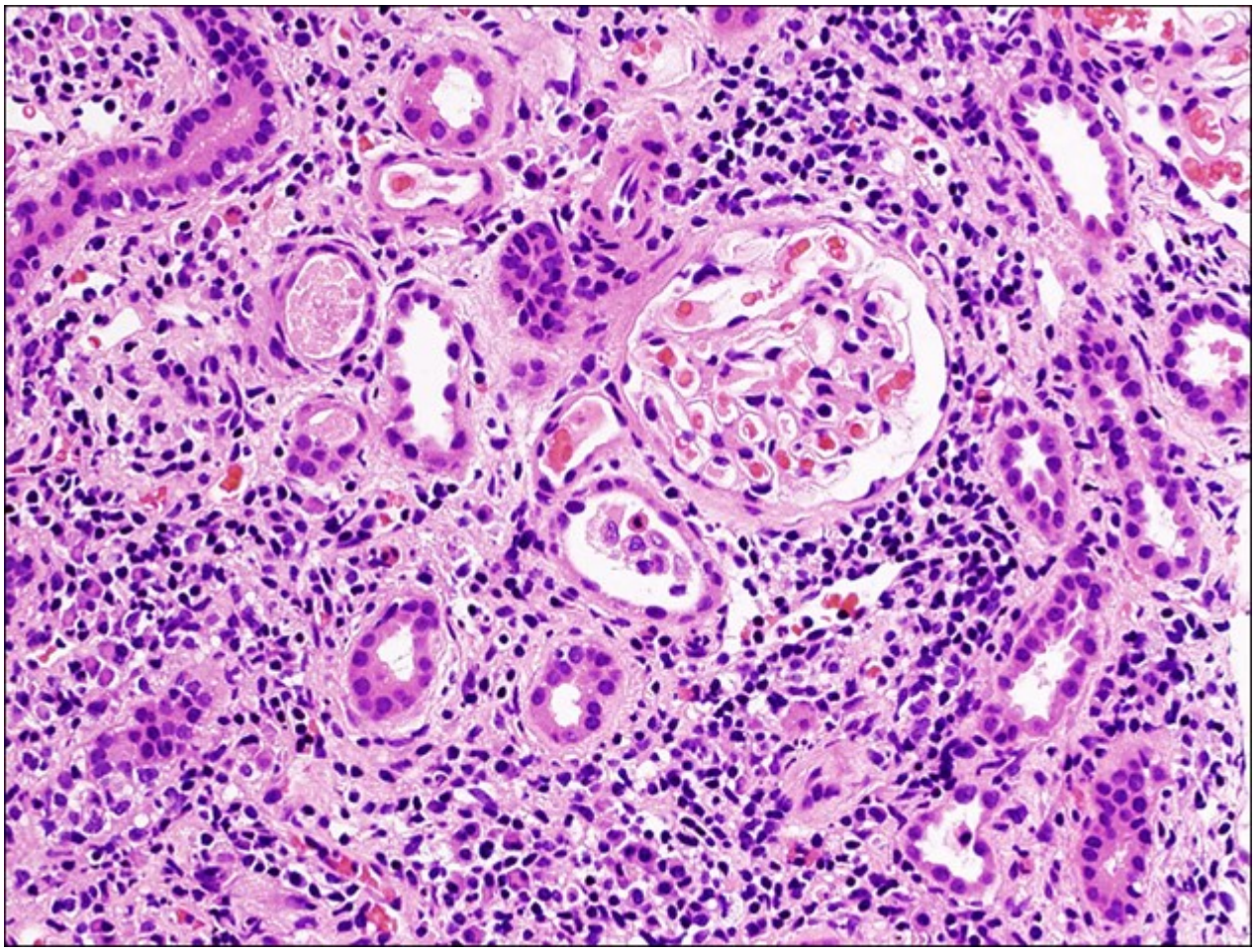
On examination, his temperature was 38.4°C, his BP was 104/62 mmHg and he had signs of a right basal pneumonia. Urinalysis showed blood 1+, protein 2+.

Investigations:

serum creatinine	470 µmol/L (60–110)

He was treated with intravenous fluids and antibiotics. Ramipril was stopped. Over the next 3 days, his temperature returned to normal and his BP increased to 152/86 mmHg, but he became oliguric and his serum creatinine increased to 724 µmol/L.

A renal biopsy was performed (see image).



What is the most likely diagnosis?

Answers

A: acute tubular necrosis
B: atheroembolisation

C: cast nephropathy
D: interstitial nephritis
E: vasculitis

Correct answer: D
Explanation
The biopsy shows a heavy interstitial lymphocytic infiltrate with tubulitis and occasional eosinophils, i.e. interstitial nephritis (answer option D); the glomerulus is normal. The high creatinine on admission suggests that this process was occurring before admission, owing to the multiple courses of antibiotics he had received. Acute tubular necrosis (answer option A) due to sepsis is a possible explanation for the further increase in creatinine during admission (and indeed the tubular epithelium looks a little flattened in places), but the predominant pathology is acute interstitial nephritis.

Question 56

E

Incorrect

A 33-year-old man with diabetic nephropathy, who had been undergoing PD for 3 years, became increasingly tired over a period of 3 months. His medication comprised oral atenolol, allopurinol, alfacalcidol and calcium acetate, and subcutaneous erythropoiesis-stimulating agent (ESA).

Investigations:

haemoglobin	50 g/L (130–180)
MCV	78 fL (80–96)
white cell count	8.0×10^9/L (4.0–11.0)
platelet count	220×10^9/L (150–400)
reticulocyte count	0.5×10^9/L (25–85)
serum ferritin	600 µg/L (15–300)
serum transferrin	6.0 g/L (2.0–4.0)
serum haptoglobin	0.10 g/L (0.13–1.63)

In addition to blood transfusion, what is the most appropriate next step?

Answers

A: desferrioxamine
B: prednisolone
C: stop allopurinol
D: stop ESA
E: switch to alternative ESA

Correct answer: D
Explanation
The patient is profoundly anaemic despite taking an erythropoiesis-stimulating agent (ESA). His MCV is low and transferrin is slightly elevated suggesting a degree of iron deficiency, but his ferritin is well maintained so he does not have severe iron deficiency, and certainly is not so iron deficient as to cause this degree of anaemia, so desferrioxamine (answer option A) is incorrect as he is not iron

overloaded. His haptoglobin is slightly lowered, but his reticulocyte count is very low, so he has no evidence of haemolytic anaemia, and therefore has no need for prednisolone (answer option B). His white blood count and platelets are normal, so he does not have agranulocytosis or generalised bone marrow suppression so aplastic anaemia (a rare complication of allopurinol) is excluded. His profound anaemia and suppressed reticulocyte count suggests he is not making red blood cells, meaning he most likely has pure red cell aplasia (PRCA) caused by an ESA. Although PRCA is more common in certain brands and less so in others, in theory all ESAs could cause PRCA so the correct answer is to stop ESA (answer option D).

Question 57

E

Correct

A 32-year-old kidney transplant recipient presented with acute graft dysfunction. He had ESRD resulting from Alport syndrome and had received a pre-emptive living-donor transplant from his father 4 months previously. Three weeks post transplant, the patient had experienced an episode of acute cellular rejection that had required treatment with antithymocyte globulin. His treatment comprised prednisolone 10 mg once daily, tacrolimus 3 mg twice daily, mycophenolate mofetil 1 g twice daily and ramipril 5 mg once daily. His serum creatinine 2 weeks before this presentation had been 122 µmol/L (60–110).

Urinalysis showed blood 1+, protein 2+, leukocytes 2+, nitrites negative.

Investigations:

serum creatinine	185 µmol/L (60–110)
serum CRP	25 mg/L (<10)
urine protein: creatinine ratio	94 mg/mmol (<30)
anti-glomerular basement membrane antibodies	positive
blood tacrolimus (trough)	15.2 nmol/L
transplant renal biopsy	sloughing of tubular epithelium with intranuclear inclusion bodies; dense tubulointerstitial inflammation, with infiltrates of lymphocytes, plasma cells and histiocytes

What is the most likely cause of graft dysfunction?

Answers

A: acute calcineurin inhibitor nephrotoxicity
B: acute cellular rejection
C: acute pyelonephritis
D: anti-glomerular basement membrane antibody disease
E: BK virus nephropathy

Correct answer: E

Explanation

The biopsy features are predominately tubular with a dense lymphocytic infiltrate, which are commonly observed in acute cellular rejection (answer option B) or BK virus nephropathy (answer option E). The presence of inclusion bodies is highly suggestive of BK virus nephropathy and is consistent with the recent escalation of immunosuppression to combat rejection. Acute calcineurin inhibitor nephrotoxicity (answer option A) causes acute arteriolopathy and tubular vacuolisation. Pyelonephritis (answer option C) causes a neutrophil infiltrate. Anti-glomerular basement membrane antibody disease (answer option D) causes predominately glomerular pathology.

Question 58

E

Incorrect

A 35-year-old woman was referred for investigation of nephrocalcinosis.

Investigations:

serum sodium	138 mmol/L (137–144)
serum potassium	3.8 mmol/L (3.5–4.9)
serum bicarbonate	21 mmol/L (20–28)
serum urea	5.1 mmol/L (2.5–7.0)
serum creatinine	87 µmol/L (60–110)

24-h urinary calcium	3.2 mmol (2.5–7.5)
24-h urinary oxalate	0.15 mmol (0.14–0.46)
24-h urinary magnesium	2.4 mmol
urine citrate:creatinine ratio	0.04 mmol/mmol (0.11–0.55)
urine PH	6.0

What is the most appropriate treatment?

Answers

A: citric acid
B: potassium bicarbonate
C: potassium citrate
D: sodium bicarbonate
E: sodium citrate

Correct answer: C

Explanation

This patient has normal renal function, calcium deposition in her kidney (not only calculi), an absence of increased calcium in her urine, and an unknown serum calcium level or parathyroid hormone level. She has a mild decrease in serum bicarbonate although it is in the normal range, and her serum potassium is also within the normal range. There is a normal excretion of calcium, oxalate and magnesium, but low citrate excretion plus acidic pH (although timing of collection is unknown).

The existence of nephron calcinosis indicates a longstanding defect, which in the absence of other pathology, is presumably associated with renal tubular acidosis-associated high potassium excretion and low citrate excretion. The correct treatment is potassium citrate (answer option C), which will inhibit calcium deposition and normalise potassium if low.

Question 59

E

Incorrect

A 48-year-old man with diabetic nephropathy was reviewed during a haemodialysis session. His dialysate calcium concentration was 1.25 mmol/L, and the dialysate temperature was 35.0°C. He achieved maximal blood flow rates of 280 mL/min against a dialysate flow rate of 600 mL/min. He was dialysed using a low-flux membrane with a surface area of 1.2 m^2. Intradialytic hypotension was reported frequently and often resulted in early cessation of therapy.

On examination, he had pedal oedema and his BP was 166/88 mmHg. He had an aneurysmal left radiocephalic fistula.

Investigations:

serum sodium	143 mmol/L (137–144)
serum potassium	3.4 mmol/L (3.5–4.9)
serum adjusted calcium	2.18 mmol/L (2.20–2.60)

urea reduction ratio	74%
single pool Kt/V	1.36

What is the most appropriate next step in management?

Answers

A: band the fistula
B: decrease dialysate flow rates
C: decrease membrane surface area
D: increase dialysate calcium
E: increase dry weight

Correct answer: D

Explanation

This patient has volume overload and has been under dialysed. Banding the fistula (answer option A), decreasing the dialysate flow rate (answer option B), decreasing membrane surface area (answer option C), or increasing dry weight (answer option E) are likely only to aggravate the problems. The

dialysate temperature was already low for combatting intradialytic hypotension. In this case, a low-calcium dialysate can contribute to haemodynamic instability during the dialysis procedure. Raising the dialysate calcium concentration would lead to an increase in ionised calcium concentration and an improvement in left ventricular contractility and less intradialytic hypotension. The correct answer is therefore increase dialysate calcium (answer option D).

Question 60

E

Correct

A 54-year-old man was referred for investigation of hypertension. He had presented to his general practitioner several weeks previously with fatigue and muscle weakness. He was a smoker.

On examination, his BP was 180/110 mmHg. Neurological examination was normal. Urinalysis was normal.

Investigations:

serum sodium	138 mmol/L (137–144)
serum potassium	3.2 mmol/L (3.5–4.9)
serum creatinine	112 µmol/L (60–110)

plasma renin concentration	117.2 mIU/L (5.4–60.0)
plasma aldosterone	900 pmol/L (90–720)

What is the most likely diagnosis?

Answers

A: Bartter syndrome
B: Cushing's syndrome
C: Liddle syndrome
D: primary aldosteronism
E: renovascular disease

Correct answer: E

Explanation

This patient has hypertension and hypokalaemia in the setting of hyper-reninaemic hyperaldosteronism. Barter syndrome (answer option A) is not typically associated with hypertension. In Cushing's syndrome (answer option B) and Liddle syndrome (answer option C) the renin and aldosterone would normally be suppressed. In primary hyperaldosteronism (answer option D), the renin level is typically below 1. The correct answer is therefore renovascular disease (answer option E).

Question 61

E

Incorrect

A 58-year-old man was found to have proteinuria. He was awaiting surgery for colonic cancer. He had been adopted and was unaware of his family history.

On examination, his BP was 140/98 mmHg. Urinalysis showed protein 3+.

Investigations:

serum sodium	134 mmol/L (137–144)
serum potassium	4.3 mmol/L (3.5–4.9)
serum urea	6.0 mmol/L (2.5–7.0)
serum creatinine	125 µmol/L (60–110)
serum albumin	34 g/L (37–49)

urine protein:creatinine ratio	402 mg/mmol (<30)

A renal biopsy was performed.

What histopathological abnormality is most likely to be detected?

Answers

A: 'double contouring' of the glomerular basement membrane
B: mesangial electron-dense deposits
C: splitting of the lamina densa in the glomerular basement membrane
D: subepithelial electron-dense deposits
E: tubuloreticular inclusions

Correct answer: D

Explanation

The history of colonic cancer suggests a possible diagnosis of membranous glomerulonephritis. This is characterised by the presence of subepithelial electron dense deposits (answer option D) on electron microscopy. Mesangial deposits (answer option B) might be seen in IgA nephropathy, but we would expect urinalysis to show micro-haematuria if there was a focal proliferative glomerulonephritis associated with that diagnosis. Similarly, the picture is not suggestive of conditions associated with double contouring (immune complex membranoproliferative glomerulonephritis) (answer option A), splitting of the lamina densa (Alport) (answer option C) or tubuloreticular inclusions (systemic lupus erythematosus) (answer option E).

Question 62

E

Incorrect

A 75-year-old man presented with difficulty in passing urine, and nocturia three to four times per night for the past year.

On examination, his bladder was just palpable. A rectal examination showed an enlarged smooth prostate.

Investigations:

haemoglobin	106 g/L (130–180)
platelet count	164 × 10^9/L (150–400)

serum creatinine	382 µmol/L (60–110)
serum adjusted calcium	2.80 mmol/L (2.20–2.60)
serum phosphate	2.10 mmol/L (0.80–1.45)
serum albumin	31 g/L (37–49)

24-h urinary total protein	2.8 g (<0.2)

ultrasound scan of renal tract	enlarged bladder, which emptied incompletely; normal-sized kidneys; no pelvicalyceal dilatation

What is the most likely diagnosis?

Answers

A: carcinoma of the prostate
B: focal segmental glomerulosclerosis
C: multiple myeloma
D: primary hyperparathyroidism
E: sarcoidosis

Correct answer: C

Explanation

Hypercalcaemia and CKD have a limited number of aetiologies. Focal segmental glomerulosclerosis (answer option B) does not cause hypercalcaemia, carcinoma of the prostate (answer option A), primary hyperparathyroidism (answer option D) and sarcoidosis (answer option E) do not cause proteinuria of this level, making multiple myeloma (answer option C) the correct answer.

Question 63

E

Incorrect

An 80-year-old man was referred to the outpatient clinic for assessment of renal impairment. He had noted a 3-kg weight loss and increased breathlessness over the past 4 months. He had a history of COPD and type 2 diabetes mellitus.

On examination, his weight was 70 kg. His BP was 140/84 mmHg. Urinalysis showed blood 1+, protein 1+.

Investigations:

serum creatinine	223 µmol/L (60–110)

urine protein:creatinine	128 mg/mmol (<30)

ratio	
anti-PR3 antibodies	2 U/mL (<10)
anti-MPO antibodies	13 U/mL (<10)
anti-glomerular basement membrane antibodies	negative
chest X-ray	spiculated mass in left apex
renal biopsy:	
histology	widespread glomerular and tubulointerstitial fibrosis; mesangial expansion and an area of nodular glomerular sclerosis
immunofluorescence	linear IgG deposition along glomerular basement membrane

What is the most likely renal diagnosis?

Answers

A: anti-glomerular basement membrane antibody disease
B: diabetic nephropathy
C: fibrillary glomerulonephritis
D: membranous glomerulonephritis
E: microscopic polyangiitis

Correct answer: B

Explanation

The stem describes a patient with diabetes who has proteinuria. The renal biopsy findings, nodular glomerular sclerosis, a chronic tubulointerstitial lesion and linear IgG staining may all be seen together in diabetic kidney disease (answer option B). This combination is most likely to be related to diabetes albeit that nodular glomerulonephritis (GN) may be seen in fibrillary GN (answer option C) and linear IgG deposition may be seen in anti-glomerular basement membrane antibody disease (answer option A). However, linear IgG deposition is not seen in fibrillary GN and the chronic tubulointerstitial lesion makes anti-glomerular basement membrane antibody disease extremely unlikely. Membranous GN (answer option D) is made more plausible by the history of weight loss and the chest X-ray finding of a spiculated mass but is not associated with nodules or linear IgG deposition. Microscopic polyangiitis (answer option E) is supported by the abnormal myeloperoxidase antibody but is inconsistent with the IgG deposition found at biopsy.

Question 64

E

Incorrect

A 24-year-old woman underwent a renal biopsy after an insurance medical examination had disclosed hypertension, haematuria and proteinuria. She was asymptomatic. Her autoantibody and serum complement tests were performed in a satellite clinic and were unavailable at the time her biopsy report was reviewed.

Light microscopic examination of the biopsy identified mesangial hypercellularity without endocapillary or extracapillary glomerulonephritis. Immunohistochemistry showed mesangial immune deposits, IgG (2+), IgA (3+), IgM (negative), complement C3 (1+) and complement C1q (1+). Electron microscopy showed mesangial fingerprint-like electron-dense deposits.

What is the most likely diagnosis?

Answers

A: C3 glomerulopathy (dense deposit disease)
B: IgA nephropathy
C: immune complex membranoproliferative glomerulonephritis
D: lupus nephritis
E: post-infectious glomerulonephritis

Correct answer: D

Explanation

Mesangial hypercellularity and a ‘full house’ of immunoglobulin deposition along with the patient’s sex and clinical presentation, make lupus (answer option D) the most likely diagnosis. C3 glomerulopathy (dense deposit disease) (answer option A) would look different on electron microscopy. IgA (answer option B) would have predominant IgA staining on immunofluorescence. Immune complex membranoproliferative glomerulonephritis (answer option C) usually has thickening of glomerular basement membrane because of immune complex deposition there and often endocapillary hypercellularity (which this does not have). Post-infectious glomerulonephritis (GN) (answer option E) usually has a diffuse proliferative GN with endocapillary proliferation.

Question 65

E

Correct

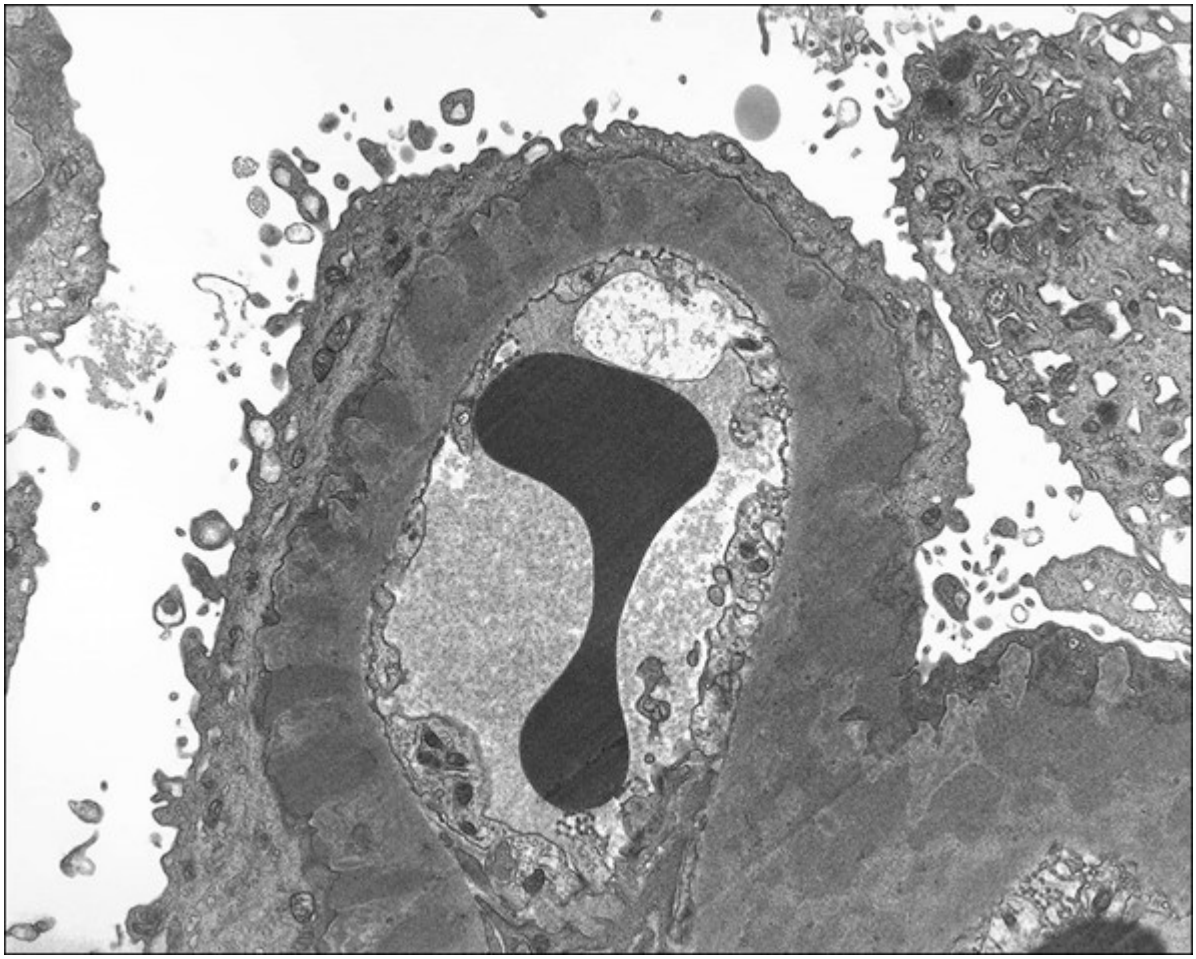
A 52-year-old woman with a 3-year history of type 2 diabetes mellitus was found to have proteinuria on routine testing. There was no relevant medical history. Her medication comprised metformin 850 mg twice daily only.

On examination, her BP was 168/78 mmHg and her BMI was 36.0 kg/m^2 (18.0–25.0). Fundoscopy showed grade 2 hypertensive changes, but no evidence of diabetic retinopathy. Urinalysis showed blood 1+, protein 3+.

Investigations:

serum creatinine	129 µmol/L (60–110)
serum albumin	34 g/L (37–49)
urine	210.0 mg/mmol (<3.5)

albumin:creatinine ratio	
ultrasound scan of kidneys	normal
renal biopsy	glomeruli appeared normal by light microscopy of a haematoxylin-and-eosin-stained section; the electron microscopic appearance of part of a typical glomerulus is shown (see image)



What is the most likely diagnosis?

Answers

A: diabetic nephropathy
B: focal segmental glomerulosclerosis
C: hypertensive nephropathy
D: IgA nephropathy
E: membranous nephropathy

Correct answer: E

Explanation

Membranous nephropathy (answer option E) typically has electron microscopic appearance of subepithelial deposits, which this image demonstrates. The single red corpuscle in the centre of the

image marks the capillary lumen, hence the endothelial layer is seen adjacent to this, then the glomerular basement membrane (GBM) and finally the epithelium is outer-most. The GBM is layered between the deposits and gives the appearance of 'spikes'. There is no evidence from the light microscopy description of the other pathologies, and immunofluorescence has not been mentioned to support IgA nephropathy (answer option D).

Question 66

E

Incorrect

A 47-year-old man with a history of primary focal segmental glomerulosclerosis presented with recurrence of nephrotic syndrome. Nine months previously, he had been treated with prednisolone and his 24-hour urinary total protein had fallen from 8.0 g to 0.3 g (<0.2) over 3 months. His current medication comprised ramipril and simvastatin.

On examination, his pulse was 80 beats/min, his BP was 120/76 mmHg and there was pitting oedema to the level of both knees. Urinalysis showed blood 2+, protein 4+.

Investigations:

serum sodium	134 mmol/L (137–144)
serum potassium	5.5 mmol/L (3.5–4.9)
serum creatinine	120 µmol/L (60–110)
serum albumin	28 g/L (37–49)
urine protein:creatinine ratio	605 mg/mmol (<30)
serum cholesterol	7.2 mmol/L (<5.2)

What is the most appropriate additional treatment at this stage?

Answers

A: candesartan
B: prednisolone
C: prednisolone and ciclosporin
D: prednisolone and mycophenolate mofetil
E: rituximab

Correct answer: B

Explanation

This man has proven corticosteroid-sensitive focal segmental glomerulosclerosis and his biochemistry shows that he has relapsed. Candesartan (answer option A) is not correct as, although he should be on an ACE inhibitor or angiotensin receptor blocker in the long term, neither of these drugs will treat a relapse. Although there is some evidence (often anecdotal or small studies only) for using ciclosporin, mycophenolate mofetil and rituximab (answer options C, D and E), in the first instance he needs to be in remission, and the quickest way to do this is to give him proven treatment with corticosteroids alone (answer option B). In due course, if he is a frequent relapse,

then discussions can be had with him to receive second-line treatment and mycophenolate mofetil, ciclosporin and rituximab could all be considered.

Question 67

E

Incorrect

A 52-year-old woman was transferred to a renal unit with rapidly deteriorating renal function and hypertension. She had been admitted 2 days previously to another hospital.

On examination, her BP was 170/98 mmHg. She was breathless at rest. Her JVP was not raised and there was no oedema.

Investigations:

haemoglobin	72 g/L (115–165)
platelet count	164 × 10^9/L (150–400)
serum sodium	143 mmol/L (137–144)
serum potassium	6.2 mmol/L (3.5–4.9)
serum creatinine	750 µmol/L (60–110)
anti-glomerular basement membrane antibodies	positive
ANCA	negative
chest X-ray	alveolar shadowing

She required dialysis shortly after admission because of oliguria and hyperkalaemia.

What is the most appropriate next step in management?

Answers

A: cyclophosphamide and prednisolone
B: cyclophosphamide, prednisolone and plasma exchange
C: mycophenolate mofetil and prednisolone
D: mycophenolate mofetil, prednisolone and plasma exchange
E: no immunosuppression necessary

Correct answer: B

Explanation

This is AKI with positive anti-glomerular basement membrane antibodies. The patient is breathless with no evidence of salt/fluid overload, anaemic and has radiological features of alveolar fluid.

These features suggest pulmonary haemorrhage and she needs potent immunosuppression with pulse methylprednisolone, cyclophosphamide and plasma exchange (answer option B).

Question 68

E

Correct

An 83-year-old man, who had been undergoing regular haemodialysis for 6 months, reported a 2-month history of increasing malaise and nausea. He underwent dialysis for 5 hours twice weekly via a radiocephalic fistula, which gave a blood flow rate of 250 mL/min. The urea reduction ratio was 74%.

Examination was normal.

Investigations (pre-dialysis):

haemoglobin	102 g/L (130–180)

serum urea	23.1 mmol/L (2.5–7.0)
serum adjusted calcium	2.70 mmol/L (2.20–2.60)
serum phosphate	2.20 mmol/L (0.80–1.45)

What is the most likely cause of his deterioration?

Answers

A: access recirculation
B: anaemia
C: hypercalcaemia
D: inadequate protein intake
E: insufficient time on dialysis

Correct answer: E

Explanation

The manifestations of nausea and malaise are non-specific, but when associated with very high levels of pre-dialysis urea and phosphate, in a patient with an acceptable urea reduction ratio of 74% (despite a blood flow rate of only 250 mL/min), indicate under dialysis with an acceptable haemodialysis access. The time on dialysis (twice weekly for 5 h) is, however, clearly insufficient (answer option E).

Question 69

E

Incorrect

A 69-year-old woman had been having haemodialysis for 13 years. She complained of stiffness and diffuse pain bilaterally in her shoulders, knees and elbows. The pain was worse at night and after dialysis. Her fistula had recently been bleeding for longer than usual after removal of the dialysis needles. She dialysed with a low-flux biocompatible dialyser through a left radiocephalic arteriovenous fistula with a blood flow rate of 400 mL/min.

On examination, she had small effusions in both knees and reduced abduction and external rotation in her shoulders.

Investigations (pre-dialysis):

serum urea	38.0 mmol/L (2.5–7.0)
serum creatinine	640 µmol/L (60–110)
serum adjusted calcium	2.55 mmol/L (2.20–2.60)
serum phosphate	2.00 mmol/L (0.80–1.45)
serum total protein	65 g/L (61–76)
serum albumin	32 g/L (37–49)
serum alkaline phosphatase	120 U/L (45–105)
serum CRP	22 mg/L (<10)
plasma parathyroid hormone	45.0 pmol/L (0.9–5.4)
urea reduction ratio	70%

What is the most likely explanation for her symptoms?

Answers

A: β_2-microglobulin amyloidosis
B: hyperparathyroidism
C: osteoarthritis
D: osteomalacia
E: polymyalgia rheumatica

Correct answer: A

Explanation

Long vintage of haemodialysis (more than 10 years) and use of a low-flux dialyser are risk factors for β_2-microglobulin amyloidosis (answer option A). The patient had typical symptoms for joint involvement of β_2-microglobulin amyloidosis. Increased bleeding from an arteriovenous fistula can also be a sign of β_2-microglobulin amyloidosis. Hyperparathyroidism (answer option B), which in this case would be associated with mild elevation of alkaline phosphates, is less likely to have these joint symptoms or bleeding tendency. Osteoarthritis (answer option C), osteomalacia (answer option D) and polymyalgia rheumatica (answer option E) do not have these symptoms.

Question 70

E

Incorrect

A 67-year-old man with adult polycystic kidney disease, who had been undergoing haemodialysis for 7 years, had been having routine monthly blood tests. He was asymptomatic. His medication comprised sevelamer hydrochloride 2.4 g three times daily with meals, epoetin beta 8000 units per week subcutaneously, iron sucrose 50 mg weekly intravenously, and vitamin B complex and vitamin C post dialysis.

Investigations:

serum adjusted calcium	2.60 mmol/L (2.20–2.60)
serum phosphate	1.50 mmol/L (0.80–1.45)
plasma parathyroid hormone	18.0 pmol/L (0.9–5.4)

What is the most appropriate further management?

Answers

A: add alfacalcidol
B: add cinacalcet
C: increase dosage of sevelamer hydrochloride
D: no action required
E: parathyroidectomy

Correct answer: D

Explanation

The bone mineral profile and parathyroid hormone (PTH) are within target range so no change in therapy is required (answer option D). Alfacalcidol (answer option A) will raise both calcium and phosphate levels and inappropriately suppress the PTH level. Cinacalcet (answer option B) is not required as the PTH is within target range, and the addition of cinacalcet will over-suppress the PTH. The sevelamer dose does not need to be increased (answer option C) as the phosphate level is within target range. There is no indication for parathyroidectomy (answer option E) as the PTH level is controlled with medical measures.

Question 71 E Incorrect

A 56-year-old woman was referred for assessment of generalised aches and pains, heartburn and nocturia. She had a history of CKD stage 3 and hypertension.

Examination was normal.

Investigations:

serum creatinine	123 µmol/L (60–110)
eGFR (CKD-EPI)	42 mL/min/1.73 m^2 (>60)
serum adjusted calcium	2.84 mmol/L (2.20–2.60)
serum phosphate	0.90 mmol/L (0.80–1.45)
serum alkaline phosphatase	145 U/L (45–105)
24-h urinary calcium	8.7 mmol (2.5–7.5)
plasma parathyroid hormone	5.6 pmol/L (0.9–5.4)
serum 25-OH-cholecalciferol	99 nmol/L (>50)

What is the most likely cause of her hypercalcaemia?

Answers

A: multiple myeloma
B: primary hyperparathyroidism
C: sarcoidosis
D: thiazide therapy
E: vitamin D intoxication

Correct answer: B
Explanation
This patient has hypercalcaemia with elevated parathyroid hormone (PTH) (answer option B). The phosphate level is within normal range, i.e. excessive renal phosphate loss has not occurred as a result of tubular PTH responsiveness being reduced in CKD. In hypercalcaemic states associated with multiple myeloma (answer option A), sarcoidosis (answer option C), thiazide use (answer option D) and vitamin D excess (answer option E), the PTH level would be low.

Question 72

E

Incorrect

A 21-year-old man was referred for investigation of haematuria and hypertension. He had visited the optician because of blurring of vision. Two uncles on his maternal side had received kidney transplants. His mother wore a hearing aid and was also being investigated for haematuria.

On examination, his BP was 165/105 mmHg. Urinalysis showed blood 2+.

Investigations:

serum creatinine	156 µmol/L (60–110)
eGFR (CKD-EPI)	52 mL/min/1.73 m^2 (>60)

What is the most likely diagnosis?

Answers

A: Alport syndrome
B: cystinosis
C: Epstein syndrome
D: Fabry disease
E: tuberous sclerosis

Correct answer: A
Explanation
The history suggests an X-linked pattern of inheritance. Alport syndrome (answer option A) is the most likely clinical diagnosis. Females are commonly affected and hearing loss is frequent in women by their middle years.

Question 73

E

Incorrect

A 28-year-old man was found to have non-visible haematuria and proteinuria after he attended a routine medical examination. He had been adopted and was unaware of his family history.

On examination, he had some hearing loss. His BP was 147/89 mmHg.

Investigations:

serum sodium	134 mmol/L (137–144)
serum potassium	4.3 mmol/L (3.5–4.9)
serum urea	11.0 mmol/L (2.5–7.0)
serum creatinine	202 µmol/L (60–110)
urine protein: creatinine ratio	180 mg/mmol (<30)

A renal biopsy was performed.

What histopathological abnormality is most likely to be detected?

Answers

A: 'double contouring' of the glomerular basement membrane
B: fibrillar deposits
C: mesangial electron-dense deposits
D: splitting of the lamina densa in the glomerular basement membrane
E: subepithelial electron-dense deposits

Correct answer: D

Explanation

The clinical scenario points towards Alport syndrome. Splitting of the lamina densa (answer option D) is a characteristic finding in Alport syndrome whereas the other options are findings characteristic of other diseases.

Question 74

E

Incorrect

A 54-year-old man presented with a 2-month history of malaise and ankle oedema.

On examination, there was pitting oedema to the knees. His BP was 190/102 mmHg.

Investigations:

serum creatinine	96 µmol/L (60–110)
serum albumin	23 g/L (37–49)
serum total bilirubin	18 µmol/L (1–22)
serum aspartate aminotransferase	106 U/L (1–31)
serum alkaline phosphatase	56 U/L (45–105)

24-h urinary total protein	10.2 g (<0.2)

serum complement C3	60 mg/dL (65–190)
serum complement C4	3 mg/dL (15–50)

What is the most likely diagnosis?

Answers

A: cryoglobulinaemia
B: membranous nephropathy
C: post-infectious glomerulonephritis
D: rheumatoid vasculitis
E: systemic vasculitis

Correct answer: A

Explanation

The stem describes a patient with oedema and hypertension with a 2-month prodrome. Investigations identify preserved renal excretory function, low albumin and extremely heavy proteinuria in association with abnormal liver function tests and complement abnormalities. The C3 is marginally low and C4 is extremely low.

Several of the distractors might be associated with one or more of the elements presented. However, the option that best fits the constellation presented is a hepatitis C-associated mixed essential cryoglobulinaemia (answer option A), in which all elements would be present.

Question 75

E

Incorrect

A 34-year-old woman with CKD resulting from IgA nephropathy was hoping to become pregnant. She wanted to know the likelihood of her developing a permanent decline in kidney function. She was taking labetalol to control her BP.

On examination, her BP was 146/90 mmHg.

Investigations:

serum creatinine	208 µmol/L (60–110)
eGFR (CKD-EPI)	26 mL/min/1.73 m^2 (>60)
urine protein:creatinine ratio	186 mg/mmol (<30)

What is the approximate risk of a permanent decline in her renal function related to pregnancy?

Answers

A: 1 in 1000
B: 1 in 100
C: 1 in 10

D: 1 in 2
E: 9 in 10

Correct answer: D

Explanation

Significant CKD, hypertension and elevated urine protein:creatinine ratio are all poor renal prognostic signs pre-pregnancy for decline. Renal Association guidelines suggest a 1 in 3 risk of dialysis for patients whose serum creatinine approximates to pre-pregnancy CKD stage 4 and 5, which increases if proteinuria is >1 g/day and/or if there is poorly controlled BP, as here. In this case, a risk of 1 in 2 (50%) (answer option D) is most likely.

Question 76

E

Incorrect

A 50-year-old man was admitted with confusion following a generalised seizure. He was unable to protect his airway and was transferred to the intensive therapy unit. He had bipolar affective disorder and had been taking lithium carbonate.

Urinalysis was normal.

Investigations:

serum sodium	143 mmol/L (137–144)
serum potassium	4.4 mmol/L (3.5–4.9)
serum creatinine	123 µmol/L (60–110)

serum lithium	4.0 mmol/L (0.5–1.2)

What is the most appropriate next step in management?

Answers

A: charcoal haemoperfusion
B: haemodialysis
C: haemofiltration
D: intravenous sodium chloride 0.9% and furosemide
E: PD

Correct answer: B

Explanation

Haemodialysis (answer option B) is the correct choice as lithium is most efficiently removed with this modality compared with haemofiltration (answer option C), PD (answer option E) or charcoal haemoperfusion (answer option A) (for which there is no data in lithium removal). He has significant neurological manifestations of lithium toxicity and urgent removal of the drug is indicated as opposed to giving supportive treatment only with sodium chloride 0.9% (answer option D; adding furosemide also may increase lithium levels). The treatment often needs to be repeated as rebound high levels of lithium occur after the initial haemodialysis.

Question 77

E

Incorrect

A 78-year-old woman had been undergoing haemodialysis three times per week for 8 years and was becoming increasingly frail. She had had several falls, become housebound and had recently been found to have colon cancer. Over several weeks, she discussed stopping dialysis, and finally decided that she would stop after her grandson's birthday.

On examination, she had mental capacity.

Investigations:

haemoglobin	106 g/L (115–165)
serum potassium	4.4 mmol/L (3.5–4.9)
serum creatinine	423 µmol/L (60–110)
dialysis Kt/V	1.4 (>1.2)
residual renal function	0

She and her family wanted to know how long she was likely to live after stopping dialysis.

What is the best estimate of her likely survival?

Answers

A: 1–2 days
B: 1–2 weeks
C: 4–6 weeks
D: 3 months
E: impossible to estimate

Correct answer: B

Explanation

This question is asking how long can someone survive with no residual renal function at all. It is very difficult to estimate survival if someone has residual function, but if a patient is anuric it is unlikely that they will survive more than 1–2 weeks (answer option B). It is of course possible that the patient could die in 1–2 days (answer option A) from other comorbidities such as severe coronary disease, but the correct answer to the family is that average survival is likely to be 1–2 weeks in this situation.

Question 78

C

Correct

A 65-year-old man presented with increasing shortness of breath over 2 weeks. He had a history of widespread vascular disease, type 2 diabetes mellitus, and CKD. He had initially been treated with haemodialysis through a tunnelled right internal jugular catheter, and had been switched to PD 2 months previously. His weekly Kt/V 2 weeks previously had been 1.6. He was a longstanding smoker.

On examination, his BP was 150/92 mmHg, his JVP was 4 cm above the sternal angle, his respiratory rate was 24 breaths/min and he had oedema (2+) to mid-calf level. He had stony dullness to percussion and reduced breath sounds in the right side of his chest.

Investigations:

serum creatinine	985 µmol/L (60–110)
serum urea	28.0 mmol/L (2.5–7.0)
serum total protein	66 g/L (61–76)
serum albumin	38 g/L (37–49)
plasma glucose at time of lumbar puncture	12.4 mmol/L

chest X-ray	pleural effusion occupying two-thirds of right hemithorax

pleural fluid:	
appearance	clear, straw-coloured
glucose	42 mmol/L
albumin	16 g/L
total protein	28 g/L
culture	no growth

What is the most likely cause of the pleural effusion?

Answers

A: bronchial carcinoma
B: heart failure
C: peritoneal-pleural leak
D: ultrafiltration failure
E: uraemic serositis

Correct answer: C

Explanation

This is a new pleural effusion in a patient who recently started treatment with PD. The pleural fluid has a much higher glucose concentration than his random blood glucose suggesting leak of his dialysate (answer option C). The alternatives would not cause this.

Question 79

E

Correct

A 67-year-old man with a history of angina developed ESRD as a complication of coronary artery bypass grafting. He was oliguric and was treated with CAPD.

Two months later, he had a raised JVP, and moderate sacral and ankle oedema. He was in atrial fibrillation with an apical rate of 96 beats/min. His BP was 152/94 mmHg. His dialysis regimen

comprised 3 × 1.36% × 2 L during the day and 1 × 2.27% × 2 L overnight.

Investigations:

haemoglobin	86 g/L (130–180)

serum urea	23.0 mmol/L (2.5–7.0)
serum creatinine	600 µmol/L (60–110)
serum albumin	35 g/L (37–49)

What is the most appropriate next step in management?

Answers

A: blood transfusion
B: convert to haemodialysis
C: digoxin and warfarin
D: high-dose furosemide
E: icodextrin exchange overnight

Correct answer: E

Explanation

This is an oliguric patient with low cardiac function on CAPD, who has developed evidence of insufficient fluid removal. He already has a hypertonic glucose-based overnight exchange. Excess fluid must be removed, and the best option for this patient with cardiac involvement is to be maintained on CAPD. The addition of overnight icodextrin exchange (answer option E) is the appropriate answer.

Question 80

E

Incorrect

A 56-year-old man presented with shortness of breath and swollen ankles. He had coughed up blood on two occasions in the past 24 hours. He had no other medical history and was not taking any medication.

On examination, he appeared unwell; his pulse was 100 beats/min and his BP was 160/90 mmHg. There were bilateral basal crackles on chest auscultation, with moderate oedema of his ankles.

Investigations:

haemoglobin	106 g/L (130–180)
platelet count	465 × 10^9/L (150–400)

serum creatinine	484 µmol/L (60–110)

anti-glomerular basement membrane antibodies	63 U/mL (<20)

chest X-ray	bilateral pulmonary infiltrates

renal biopsy	crescentic glomerulonephritis with linear IgG deposits

He was treated with plasma exchange, cyclophosphamide and prednisolone.

What is the most likely complication of treatment with plasma exchange?

Answers

A: anaphylaxis
B: coagulopathy
C: hypercalcaemia
D: hypertension
E: hyponatraemia

Correct answer: B

Explanation

Depletion of clotting factors by plasma exchange is most likely to cause coagulopathy (answer option B) rather than any of the other complications listed.

Question 81

E

Incorrect

A 28-year-old woman with CKD secondary to IgA nephropathy attended a routine clinic appointment. She had a history of severe asthma and hypertension. She was planning a pregnancy and asked for advice regarding her BP management before conception. Her regular medication comprised ramipril.

On examination her BP was 126/64 mmHg. Urinalysis showed blood1+ protein 3+.

Investigations:

serum sodium	137 mmol/L (137–144)
serum potassium	4.9 mmol/L (3.5–4.9)
serum urea	7.5 mmol/L (2.5–7.0)
serum creatinine	129 µmol/L (60–110)
eGFR (CKD-EPI)	49 mL/min/1.73 m2 (>60)

urine protein:creatinine ratio	209 mg/mmol (<30)

What is the most appropriate next step in management?

Answers

A: make no change to treatment
B: substitute amlodipine for ramipril immediately

C: substitute labetalol for ramipril immediately
D: substitute labetalol for ramipril on confirmation of pregnancy
E: substitute methyldopa for ramipril on confirmation of pregnancy

Correct answer: D
Explanation
Labetalol is the preferred drug to treat hypertension in pregnancy (NICE Guidelines 2019). As ACE inhibitors have a detrimental effect in second rather than first trimester it is recommended that they should be continued until pregnancy is confirmed because of the specific additional anti-proteinuric benefit in CKD (answer option D).

Question 82

E

Incorrect

A 51-year-old woman was reviewed 6 months after renal transplantation. Two weeks previously her serum creatinine had been 98 µmol/L (60–110). Her donor was CMV positive, Epstein–Barr virus (EBV) positive and she was CMV negative, EBV positive. She had taken valganciclovir and co-trimoxazole prophylaxis for 3 months after the transplant. Her immunosuppression comprised tacrolimus, mycophenolate mofetil and prednisolone.

On examination, she had a temperature of 37.2°C. Her transplant kidney was non-tender.

Investigations:

haemoglobin	129 g/L (115–165)
white cell count	2.6×10^9/L (4.0–11.0)
platelet count	164×10^9/L (150–400)

serum creatinine	131 µmol/L (60–110)
serum alanine aminotransferase	73 U/L (5–35)
serum aspartate aminotransferase	86 U/L (1–31)
serum alkaline phosphatase	156 U/L (45–105)
serum gamma glutamyl transferase	95 U/L (4–35)

blood tacrolimus (trough)	8.2 µg/L

What is the most likely diagnosis?

Answers

A: acute rejection
B: CMV infection
C: EBV infection
D: pneumocystis jirovecii infection
E: tacrolimus toxicity

Correct answer: B
Explanation

The clinical picture is most in keeping with CMV infection (answer option B). CMV infection commonly occurs in donor-positive, recipient-negative transplant patients after prophylaxis is withdrawn. Acute rejection (answer option A) is unlikely given the level of immunosuppression and will not explain all the clinical features. Tacrolimus toxicity (answer option E) similarly will not cause the other features seen and would be unlikely at this trough level.

Question 83

E

Incorrect

A 28-year-old woman with hypertension and CKD stage 2 wished to become pregnant. Her medication comprised ramipril, bendroflumethiazide, atorvastatin, isotretinoin and long-term low-dose cefalexin for recurrent cystitis.

She asked whether it was necessary to continue her medication while trying to conceive.

On examination, her BP was 137/83 mmHg.

Investigations:

serum creatinine	80 µmol/L (60–110)
serum cholesterol	6.2 mmol/L (<5.2)
ultrasound scan of kidneys	scar on the right kidney

Which drug is it most appropriate to continue?

Answers

A: atorvastatin
B: bendroflumethiazide
C: cefalexin
D: isotretinoin
E: ramipril

Correct answer: C

Explanation

UTIs in pregnancy can induce additional problems so should be prevented if possible by continuing cefalexin (answer option C). This antibiotic does not have teratogenic effects. The other four drugs are associated with an increased risk of fetal or maternal problems.

Question 84

E

Incorrect

A 72-year-old man presented with a 5-day history of malaise, lethargy, cough with bloody sputum and shortness of breath on minimal exertion.

On examination he was pale, and his BP was 148/82 mmHg. There were fine crackles at both lung bases. Urinalysis showed blood 3+, protein 2+.

Investigations:

haemoglobin	83 g/L (130–180)
serum urea	23.0 mmol/L (2.5–7.0)
serum creatinine	483 µmol/L (60–110)
anti-glomerular basement membrane antibodies	63 U/mL (<20)
chest X-ray	bilateral pulmonary infiltrates
renal biopsy	necrotising glomerulonephritis with cellular crescents

He was treated with cyclophosphamide, three daily pulses of intravenous methylprednisolone, and plasmapheresis with fresh-frozen plasma as replacement fluid.

The day after starting plasmapheresis, he developed nausea, vomiting and chest pain.

What is the most likely cause of his symptoms?

Answers

A: hypocalcaemia
B: hypokalaemia
C: hypomagnesaemia
D: hyponatraemia
E: hypophosphataemia

Correct answer: A

Explanation

Citrate-based anticoagulants or infused albumin will bind calcium resulting in hypocalcaemia (answer option A).

Question 85

E

Incorrect

A 25-year-old African–Caribbean man was referred from the genitourinary medicine clinic with proteinuria. He had been HIV positive for 5 years and had been taking highly active antiretroviral therapy (HAART) for 3 years. His older brother had CKD stage 5 and was receiving regular haemodialysis.

On examination, his BP was 175/90 mmHg. There was bilateral pitting oedema to the mid-calf. Urinalysis showed protein 4+.

Investigations:

serum sodium	143 mmol/L (137–144)
serum potassium	4.4 mmol/L (3.5–4.9)
serum creatinine	154 µmol/L (60–110)
serum albumin	31 g/L (37–49)
serum cholesterol	7.0 mmol/L (<5.2)

urinary protein:creatinine ratio	341 mg/mmol (<30)

HIV viral load	fully suppressed

What is the most likely diagnosis?

Answers

A: HIV-associated nephropathy
B: idiopathic focal segmental glomerulosclerosis
C: lupus nephritis
D: membranous nephropathy
E: minimal change disease

Correct answer: B

Explanation

The positive family history and African–Caribbean background make focal segmental glomerulosclerosis linked to the APOL1 gene the most likely diagnosis (answer option B). HIV nephropathy (answer option A) is unlikely when he has been taking HAART for this length of time and viral load suppressed. There are no features to suggest lupus (answer option C).

Question 86

E

Incorrect

A 46-year-old white woman was planning a holiday in rural India and sought advice before travelling. She had undergone kidney transplantation 2 years previously and was taking ciclosporin and mycophenolate mofetil as maintenance immunosuppression.

Investigations:

serum creatinine	127 µmol/L (60–110)
eGFR (CKD-EPI)	44 mL/min/1.73 m2 (>60)

What is the most appropriate pre-travel vaccination for her?

Answers

A: oral polio
B: oral typhoid
C: rabies
D: tetanus

E: yellow fever

Correct answer: D

Explanation

Tetanus is the only vaccine that she can safely have (answer option D). The other vaccines are contraindicated in an immunosuppressed individual.

Question 87

E

Incorrect

A 68-year-old man was reviewed in the haemodialysis clinic with increasing fatigue. His dosage of erythropoietin-stimulating agents (ESA) had been steadily increased over the previous 6 months without improvement. He denied any bleeding and there had been no significant blood losses from haemodialysis circuits. He had had no infections recently and his fistula had been functioning well. His other medication included iron sucrose, calcitriol and ramipril.

Investigations:

haemoglobin	92 g/L (130–180)
MCV	82 fL (80–96)
reticulocyte count	92 × 10^9/L (25–85)
transferrin saturation	39% (20–50)
serum adjusted calcium	2.71 mmol/L (2.20–2.60)
serum phosphate	2.31 mmol/L (0.80–1.45)
serum albumin	43 g/L (37–49)
serum globulin	30 g/L (24–27)
serum alkaline phosphatase	124 U/L (45–105)
serum ferritin	701 µg/L (15–300)
plasma parathyroid hormone	18.9 pmol/L (0.9–5.4)

What is the most likely diagnosis?

Answers

A: hyperparathyroidism
B: myelofibrosis
C: myeloma
D: occult blood loss
E: pure red cell aplasia

Correct answer: A

Explanation

Hyperparathyroidism is an important cause of ESA resistance (answer option A). A reticulocyte response is against myelofibrosis (answer option B) being the explanation, the normal albumin and globulin levels exclude the presence of a paraprotein (answer option C), iron deficiency as well as a low MCV would be present with occult bleeding (answer option D) and pure red cell aplasia (answer option E) is no longer seen and was almost exclusively with epoetin alfa.

Question 88

E

Incorrect

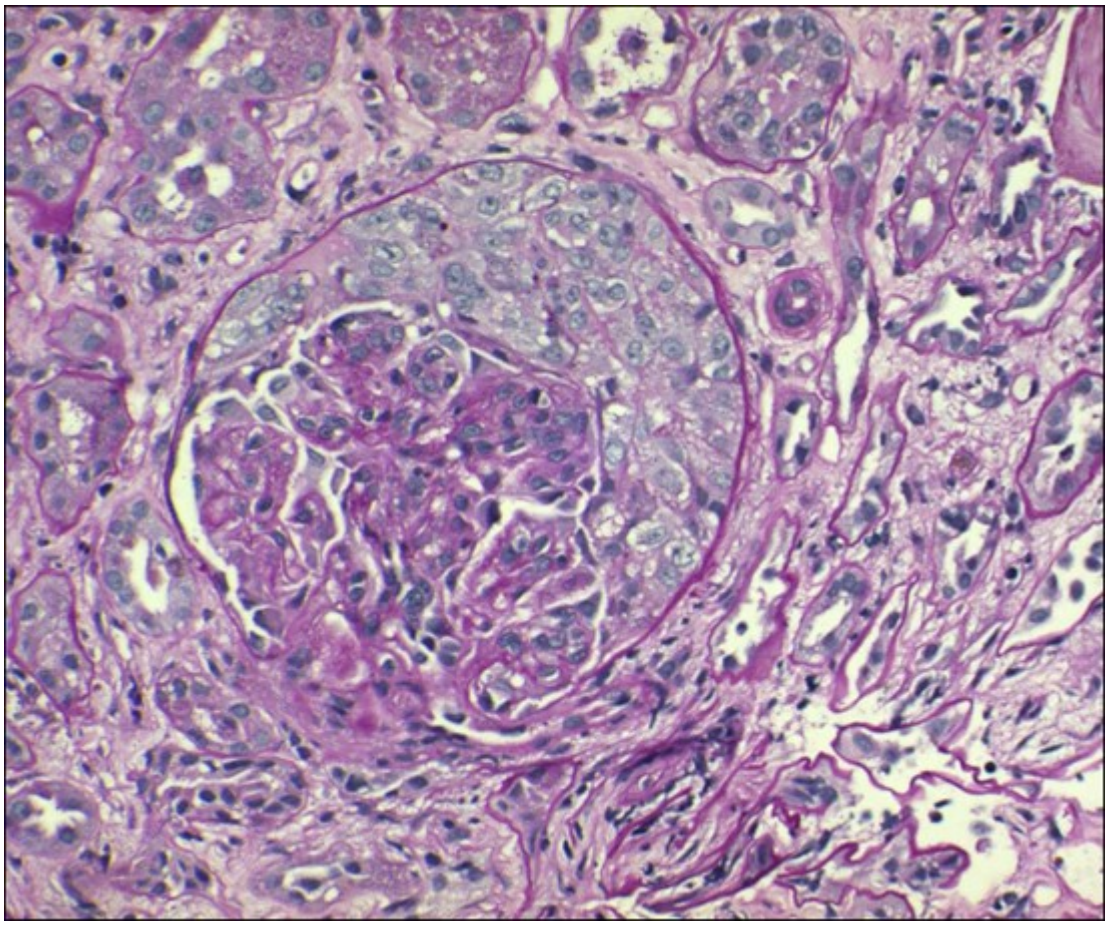
A 55-year-old woman complained of a 1-month history of lethargy, fatigue and ankle oedema. She had no other medical history and had arrived in the UK from Zimbabwe 2 years previously. She was not taking any medication.

On examination, she had oedema to her mid-calves. Her BP was 170/102 mmHg. Urinalysis showed blood 2+, protein 3+.

Investigations:

haemoglobin	102 g/L (115–165)
white cell count	3.6 × 10^9/L (4.0–11.0)
platelet count	342 × 10^9/L (150–400)

serum creatinine	223 µmol/L (60–110)
serum albumin	26 g/L (37–49)
renal biopsy: light microscopy (PAS stain)	see image



What is the most likely diagnosis?

Answers

A: collapsing glomerulopathy
B: crescentic glomerulonephritis
C: fibrillary glomerulonephritis
D: focal segmental glomerulosclerosis
E: malignant hypertension

Correct answer: A

Explanation

The biopsy shows characteristic features of collapsing glomerulonephritis (answer option A). No crescents are seen (answer option B), and no arteriolar changes (answer option E), and it is not typical of focal segmental glomerulosclerosis (answer option D). Fibrillary changes (answer option C) would only be apparent on electron microscopy.

Question 89

E

Incorrect

A 51-year-old woman was reviewed 8 months after a living-donor kidney transplant. She felt well. Her immunosuppression comprised tacrolimus, mycophenolate mofetil and prednisolone. She had taken valganciclovir and co-trimoxazole prophylaxis for the first 6 months after transplantation.

On examination, there were no abnormal findings. Her graft was non-tender.

Investigations:

haemoglobin	129 g/L (115–165)
white cell count	2.6×10^9/L (4.0–11.0)
platelet count	164×10^9/L (150–400)

serum creatinine	101 µmol/L (60–110)
serum aspartate aminotransferase	46 U/L (1–31)
serum gamma glutamyl transferase	55 U/L (4–35)
serum lactate dehydrogenase	278 U/L (10–250)
blood tacrolimus (trough)	7.0 nmol/L

What is the most appropriate next investigation?

Answers

A: bone marrow aspirate
B: CMV PCR
C: mycophenolic acid AUC monitoring
D: serum vitamin B12 and folate
E: thiopurine-S-methyltransferase (TPMT) genotyping

Correct answer: B

Explanation

Leukopenia and mild liver dysfunction are seen in CMV infection, which typically occurs in the weeks after prophylaxis is stopped, hence answer option B is the correct choice. As haemoglobin and

platelets are normal a bone marrow biopsy would not be considered at this stage (answer option A). Option C is not a routine test and if mycophenolate mofetil toxicity is suspected dose reduction would be usual action. There is nothing to suggest either B12 or folate deficiency (option D), which would usually be accompanied by anaemia. Option E relates to azathioprine toxicity rather than mycophenolate mofetil toxicity.

Question 90

E

Incorrect

A 19-year-old woman was referred by her general practitioner to the renal clinic with low-grade proteinuria. The patient had had symptomatic urinary tract infections as a child.

On examination, her BP was 132/84 mmHg. Urinalysis showed protein 2+.

Investigations:

serum creatinine	101 µmol/L (60–110)
eGFR (CKD-EPI)	54 mL/min/1.73 m^2 (>60)
urine albumin:creatinine ratio	45 mg/mmol (<3.5)
ultrasound scan of kidneys	right bipolar diameter 10.2 cm; left bipolar diameter 10.6 cm

What is the most appropriate test to confirm the cause of CKD?

Answers

A: CT scan of kidneys, ureters and bladder
B: DMSA scan
C: isotopic measurement of GFR
D: renal arteriogram
E: renal biopsy

Correct answer: B

Explanation

The clinical picture is most in keeping with reflux nephropathy. DMSA scan (answer option B) is most likely to detect renal scarring and confirm the diagnosis. The other investigations would identify other causes of CKD or not be the appropriate next investigation in a patient with this clinical history.

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